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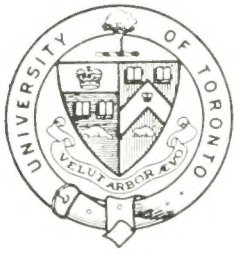
Some Plans and Suggestions for Housing Consumptives

PUBLISHED BY
THE NATIONAL ASSOCIATION
FOR THE STUDY AND PREVENTION OF TUBERCULOSIS,
105 EAST TWENTY-SECOND ST., NEW YORK
1909



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Adirondack Cottage Sanitarium, Trudeau, N. Y. The Original One-room Cottage where Dr. Edward L. Trudeau began his Experiment with the Open-air Treatment of Tuberculosis.

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Preface

The extraordinary growth in anti-tuberculosis activity during the last few years has been marked to an especial degree by increased provision for the institutional care of tuberculous patients. There has resulted a demand for expert advice in the establishment of sanatoria and hospitals which the National Association for the Study and Prevention of Tuberculosis is making every effort to meet.

Recognizing the need of some brief publication embodying the results of recent experience in sanatorium construction, the Board of Directors of the National Association appointed a special committee to supervise the preparation of such a pamphlet. The immediate task was placed in the hands of Dr. Thomas Spees Carrington, who has by correspondence and personal investigation covered the entire field of the United States, and a preliminary report of his studies is presented in the following pages.

While accumulating this information an effort has been made to collect in the office of the National Association much more detailed data of sanatorium and hospital construction, architects' plans, drawings, etc., all of which are at the disposal of any one interested, and regarding which correspondence will at all times be welcomed. The present pamphlet is therefore simply a preliminary publication containing hints and suggestions of types of construction about which more detailed information can be obtained by subsequent inquiry.

As in other important fields of its activity, the National Association is largely indebted to the Russell Sage Foundation for the means of carrying on this work, and welcomes the opportunity of acknowledging its obligation.

LIVINGSTON FARRAND,
Executive Secretary.

Contents

		PAGE
Introduction		8
Section I.	Grouping of Sanatorium Buildings	13
II.	Administration Buildings	19
III.	Administration Buildings and Patients' Quarters Combined	29
IV.	Patients' Quarters—Lean-to Type of Buildings	35
V.	Patients' Quarters—Infirmaries and Buildings for Advanced Cases	47
VI.	Patients' Quarters—Cottage Type of Buildings	61
VII.	Remodeled Farm-houses	73
VIII.	Day Camps	77
IX.	Sleeping Porches for Home Treatment	83

Illustrations

FRONTISPIECE—DR. TRUDEAU'S ORIGINAL COTTAGE.

SECTION I

GROUPING OF SANATORIUM BUILDINGS

No.		PAGE
1	Maryland Tuberculosis Sanatorium	15
2	Vermont Sanatorium	16
3	Vermont Sanatorium, Floor Plans	17
4	Agnes Memorial Sanatorium, Denver, Colorado	18

SECTION II

ADMINISTRATION BUILDINGS

5	Eudowood Sanatorium, Administration Building	23
6	First, Second, and Third Floor Plans	23
7	Basement Floor Plan	24
8	Iowa State Sanatorium, Administration Building	25
9	First Floor Plan	25
10	Second Floor Plan	26
11	Otisville Sanatorium, Administration Building	27
12	First Floor Plan	27
13	Side Elevation	28
14	Second Floor Plan	28

SECTION III

ADMINISTRATION BUILDINGS AND PATIENTS' QUARTERS COMBINED

15	Sharon Sanatorium, Sharon, Mass.	31
16	Tuberculosis Hospital, Washington, D. C.	32
17	Basement Floor Plan	33
18	First Floor Plan	33
19	Second Floor Plan	34
20	Third and Fourth Floor Plans	34

SECTION IV

PATIENTS' QUARTERS—LEAN-TO TYPE OF BUILDING

21	The Improved King Lean-to	37
22	Floor Plan	37
23	View of Porch	38
24	Michigan State Sanatorium, Lean-to	39
25	Floor Plan	39
26	Maryland Tuberculosis Sanatorium, Lean-to	40
27	Floor Plan and Side Elevation	40
28	Otisville, New York, Sanatorium, Lean-to	41
29	Martins Brook Sanatorium, Lean-to	42
30	Eudowood Sanatorium, Lean-to	43
31	Floor Plan, Heating Cellar	43
32	Boston Consumptives' Hospital, Cottage Ward	44
33	Floor Plan	44
34	Detroit Board of Health Lean-to	45
35	Michigan State Sanatorium, Plan Suggested for Lean-to	45
36	Iowa State Sanatorium, Pavilion, 40 Patients	46
37	Front Elevation	46
38	Floor Plan	46

SECTION V

PATIENTS' QUARTERS—INFIRMARIES AND BUILDINGS FOR ADVANCED CASES

39	Eudowood Sanatorium, Infirmary Building	49
40	Floor Plan	49
41	Lakeville Sanatorium, Men's Pavilion and Floor Plan	50

No.		PAGE
42	Ohio State Sanatorium, Infirmary	51
43	Floor Plan	51
44	Otisville Sanatorium, Women's Infirmary	52
45	Rear View	52
46	Front Elevation	53
47	First Floor Plan	53
48	Second Floor Plan	53
49	Ohio State Sanatorium Cottage	55
50	Floor Plan	55
51	United States Hospital, Fort Bayard, Front Elevation	56
52	Floor Plan	56
53	Side Elevation	57
54	Inner Court	57
55	Riverside Hospital, Concrete Pavilion	58
56	First Floor Plan	58
57	Second and Third Floor Plan	59
58	Fourth Floor Plan	59
59	Massachusetts Hospital School for Crippled Children	60
60	Interior of Ward	60

SECTION VI

PATIENTS' QUARTERS—COTTAGE TYPE OF BUILDING

61	Millet Sanatorium, Cottage	63
62	Floor Plan, Front and Side Elevation	63
63	Iowa State Sanatorium, Cottage	64
64	Floor Plan	64
65	Otisville Sanatorium, Cottage	65
66	Floor Plan	65
67	Otisville Sanatorium, Modified Cottage	66
68	Floor Plan	66
69	Portland, Open-air Sanatorium, Cottage	67
70	Interior	67
71	White Haven Sanatorium, Cottage	68
72	Floor Plan	68
73	Barlow Sanatorium, Cottage	69
74	Floor Plan	69
75	Adirondack Cottage Sanitarium, Nathan Cottage	71
76	Floor Plan	71
77	Loomis Sanatorium, Orchard Cottage	72
78	Floor Plan	72

SECTION VII

REMODELED FARM-HOUSES

79	Loomis Sanatorium, Hillside Farm-house before Remodeling	75
80	Hillside Farm-house after Porches were Added	75
81	Loomis Sanatorium, Chapman Cottage, Farm-house after Remodeling	76
82	Chapman Cottage, Interior Porches	76

SECTION VIII

DAY CAMPS

83	Cambridge Day Camp	79
84	Floor Plan	79
85	Vanderbilt Clinic Day Camp	80
86	Floor Plan	80
87	Boston Consumptives' Hospital Day Camp	81
88	Floor Plan	81
89	Sea Breeze Junior	82
90	Interior View	82

SECTION IX

SLEEPING PORCHES FOR HOME TREATMENT

91	Sleeping Porch on Veranda Roof	85
92	Well Built Porch with Roof and Canvas Sides	85
93	Temporary Porch with Adjustable Awning	86
94	Well Protected Temporary Porch	86
95	Temporary Porch without Protection	87

Introduction

When a community wishes to build a sanatorium in which to house its tuberculous patients, the question at once assumes such a complicated aspect that unless some one interested has had large experience in planning and managing such institutions, the promoters soon feel that the task before them is almost a hopeless one. The plans in this pamphlet and the suggestions made are offered with the hope that they will help to smooth out the complications in some instances.

With such a problem, it is only by entertaining the simplest and most economical suggestions that one can hope, particularly in small communities, to carry through the project. Beautiful and elaborate institutions costing hundreds of thousands of dollars have been designed and built, but careful investigation shows that as good results in returning the patients to health can be shown by small institutions built along cheap, simple, and economical lines. What is of equal importance is that the institution sends back its patients into the world and to the social status from which they came, without having unsettled their minds and made them discontented with the environment and life to which they belong. If we place patients from the tenement districts among surroundings which to them are luxurious, and keep them there from six months to two years, we are bound to create in them a mental state which unfits them for the life to which they must return. While luxuriously equipped sanatoria have discharged numbers of discontented individuals who have returned to poor and squalid domestic surroundings, excellent results have also been obtained in institutions providing only the actual necessities of life, since sending the patient from a city home to an outdoor life in the country often is sufficient change to bring about a cure. Those who adhere rigidly to extreme simplicity and economy in sanatorium construction and furnishing, and who supply patients with good wholesome food, cleanliness, light employment, and a happy, friendly atmosphere, need not fear that they will ruin the citizen while curing the individual.

In selecting a site communities must decide whether the advantage of having the patients near at hand and accessible to their friends overweighs the slight advantage obtained by placing the institution in the mountains or other regions distant from the patients' homes. Within a short distance of almost every city and town of this country land can be obtained on which tuberculous patients will do well, but when large institutions are to be erected the question of a site must be considered with care. The climatic conditions should be investigated and are very important. This will include obtaining data with regard to the altitude, average humidity, number of stormy days in the year, highest and lowest degree of heat and cold, prevailing winds, and other natural conditions which may affect either the patients or building materials. It is well to remember that vastly differing climatic conditions are often found within a radius of a few miles, and the information in regard to these conditions should be gathered on the site itself. The southern exposure of a hill or mountain is usually to be preferred. Sites where strong prevailing winds exist during certain seasons of the year should be avoided. If heavy frosts are frequent during the winters, substantial buildings and heating plants will be necessary, and more careful consideration given to the placing of baths, toilets, and sinks, so as to keep the water supply and drainage from freezing. Often the site selected will supply some of the building

material. In many parts of the country timber is plentiful, and in these localities frame buildings will be the cheapest. Shacks have sometimes been erected in the lumber regions with no expense except for the cost of labor. In many places sand for concrete, clay for adobe brick, and rock for stone buildings will be found on the property selected. The question of drainage will often be greatly simplified if the sanatorium can be erected on the side of a hill or mountain. Transportation facilities should always be considered, as a long haul from the railroad or landing adds expense both in building and maintenance.

Where there are no natural facilities for the removal of sewage near the property, a disposal plant is necessary. The water-supply must be ample and situated above the building site, or the expense of a water pumping plant should be added to the cost of construction. A sandy soil is best, and trees make a good wind break and shelter, as well as adding to the natural beauty.

The requisites spoken of here may seem perfectly obvious to many, but they are sometimes overlooked in the haste to acquire a property with *some* desirable features.

Before taking up for consideration the type of structure to be erected, a careful estimate of the amount of money available for building purposes only should be made. It must be decided whether incipient, advanced, or both classes of patients are to be cared for, and the number of beds the institution is to contain.

After the site has been chosen and building material decided upon, plans for a suitable administration building should be worked out first. A sanatorium or hospital, even when built for a small number of patients, must have some kind of a structure in which the details of its management can be carried on. The larger the institution, the more complicated this question becomes; but practically all plants need doctors' and nurses' quarters, a laboratory, and an observation ward, kitchen pantry, storerooms, dining-room, baths, toilets, servants' quarters, and a laundry. In a sanatorium for the open-air treatment of tuberculosis these apartments are usually provided for in a separate building, and cottages or lean tos built about it to complete the institution.

Often farm houses or other buildings are found on the land selected, and can be remodeled so as to make useful administration buildings where economy is necessary. Old farm houses have been remodeled by building wide verandas around them, which make fairly comfortable open air quarters for small numbers of patients. This leaves the interior for administration purposes, and gives a small but complete sanatorium under one roof.

The question of building for advanced and incipient cases ought to be considered separately, when possible. Authorities agree that patients in the early stages of tuberculosis should *live* out of doors. This can be more easily insisted upon when institutions are constructed in a manner to give plenty of comfortable open air porch room, and only enough warmed space for the necessary dressing and toilet facilities.

The evolution of the lean-to or shack type of building to its present usefulness and numerous modified plans, is due to faith in the open-air treatment. When planning buildings for the cure of tuberculosis an open building should be an open building, and not built with glass and sash which patients can use to turn it into a closed one.

One large, well warmed room, with a locker for each patient and sufficient bathing and toilet facilities attached to an open structure, housing sixteen beds, makes a very satisfactory building for incipient cases. The patients occupying these quarters will usually be strong enough to be up during the day, and will often improve faster if they have light employment. In some institutions the patients do the housework. This saves the wages of servants and the expense of building quarters for them. Work

and entertainment are becoming more and more important factors in the treatment of tuberculosis, and those who wish to have an institution where the best results will be obtained must provide pavilions for games, libraries, and specially constructed buildings where industries suitable to the social status of the patients received can be carried on.

Many of the plans in this pamphlet have been selected to meet the demands of those who have raised small sums for building purposes and wish to open an institution at the earliest possible moment. In all cases the building material suggested and the finish given for the interior of the buildings should be changed to suit local conditions.

Open-air quarters do not need to be plastered. Timbers and ceilings can be left in the rough or planed, and stained or varnished. A comparatively cheap and durable floor for interiors is obtained by laying and glueing linoleum over narrow, closely fitted boards. Many of the different composition floors wear well and can be used for laboratories, toilets, and kitchens. Verandas where exposed to the weather are well preserved by canvas, tacked to the boards and painted.

The plumbing should be open and of durable material. The lockers for clothes should be built large enough to make a small private dressing-room for each patient. The room that contains them should be built in such a manner that it can be closed tightly and disinfected with formaldehyde gas.

Many authorities believe that tuberculous patients do better when housed in small numbers, and while it is slightly more expensive to build verandas and rooms to accommodate only two or four persons, patients seem more contented when housed in this manner.

In advanced cases the comfort of the patient is of more importance and always calls for more expensive plants. Verandas and other open-air sleeping accommodations, while needed, do not take the place of well warmed and ventilated rooms or wards, which must be supplied for all far advanced cases. These patients need the personal care of nurses and servants, and so quarters for both, as well as diet kitchens and other facilities, found in general hospitals, must be planned for.

Enclosed rooms for advanced cases should always be plastered, and the angles at the junction of side walls and the walls with ceilings rounded. The windows should, if possible, face the south, with a veranda in front, upon which the bed can be rolled in pleasant weather.

Windows should be cut down to the floors, and doors and windows made wide enough to allow the easy running of the beds through them. Sills should not be used in the doorways or windows that open to the floor.

Doors should be made smooth, without panels, and the casings of doors and windows placed in a position to bring them level with the plaster of the walls.

Closets or wardrobes ought not to be built into the walls, which should be finished with oil paint. A good cement, painted with white enamel for the toilet and bath-room walls, with some waterproof process floor, help to make such buildings for advanced cases aseptic.

The statements of cost of construction in this pamphlet are only approximate, as it has been found impossible to lay down definite prices for buildings, where so many factors affect the question, especially near large cities. The price of labor and material depends upon local conditions, and in many instances at least a part of both have been donated.

Some of the structures were built by carpenters who received a yearly wage, charged to the maintenance account of the sanatorium. Often patients have assisted in the work, and the material used bought at a lower rate than the usual prices quoted [illegible] because [illegible] intended for [illegible] purposes. Under these

circumstances it is suggested that any plans selected from this pamphlet be submitted to a local architect or contractor with the request that an estimate of the cost of construction be made with reference to the local prices prevailing.

In order to show how $100,000 appropriated for the construction of a sanatorium can be apportioned, the result of a State Commission's labor in building an institution for 150 patients is given here:

Administration building	$31,500
Four lean-tos for 20 patients each	14,000
Two wards for advanced cases (24 patients each)	14,000
Power-house and heating plant	5,000
Sewage disposal plant	2,000
Water pumping and supply plant	5,000
Boilers and machinery	3,300
Furnishings	7,000
Laundry	1,200
Land (site)	5,500
Expenses of Commission	11,500
Total	$100,000

Only 128 beds are accounted for in this table, but the buildings are large enough to accommodate 22 patients more in the different pavilions and by using the large rooms between the wards.

In closing this introduction perhaps there is no better way of summing up the points that ought to be considered when choosing a site and building a sanatorium, than to insert the form used by the National Association for the Study and Prevention of Tuberculosis when asking for information needed by the Bureau of Hospital and Sanatorium Construction.

SITE

1. How many acres of land are available for Sanatorium purposes?
2. Is the ground flat, rolling, or on a hillside?
3. What is the degree and exposure of the slope of the hill?
4. Are there trees for protection from prevailing winds?
5. What is the direction of the prevailing winds in summer? In winter?
6. What is the altitude above sea-level and above surrounding country?
7. What is the amount of moisture precipitation per year?
8. What is the average amount and duration of snow?
9. What is the highest and lowest recorded temperature?
10. What is the mean temperature of the winter months?
11. What is the mean temperature of the summer months?
12. Is it possible to use the local water-supply of the nearest town?
13. At what height on the property above or below the building site is the water-supply?
14. What is the amount of water flow in gallons per minute?
15. What is the direction and size of the water-courses on the property?
16. What are the lighting facilities in the neighborhood, gas, electricity, etc.?
17. What is the composition of the soil?
18. What building materials are available on or near the property? Can sand, building stone, rough stone for foundation, brick, cement, lime and timber be easily obtained?
19. What are the transportation facilities, such as railroad, trolley lines, etc.?

20. Where is the principal approach to the proposed site?
21. What is the distance from the nearest saw and planing mill?
22. Are there any old buildings on the site? (Give full description with a drawing of floor plans and photographs of the front and side elevation.)

NOTE: Sketch map of proposed property showing location of buildings, entrances, water-courses, etc., is very desirable.

BUILDINGS

23. What funds are available for the building alone?
24. What is the number of patients to be housed?
25. What class of patients are to be cared for, advanced or incipient?
26. Will the patients be expected to pay anything, and if so, how much?
27. What kind of employment can be supplied to patients?
28. What are the possibilities of affording amusement, entertainment, and other occupations intended to make the patients contented?
29. Is there any special reason why patients should have separate rooms?

NOTE: In a complete administration building the following rooms are usually provided, but it depends on the size of the staff and the condition of the patients as to whether they are all necessary. All rooms which can be dispensed with, should be struck from this list.

Dining-room for patients
Dining-room for staff
Dining-room for servants
Kitchen
Bakery
Serving-room
Dish closet
Cooler
Physician's office
Special treatment room
Waiting room
Laboratory
Drug-room
Business office
Sitting-room, general
Library
Entertainment hall
Physician's quarters
Superintendent's quarters
Nurses' quarters
Servants' quarters
Sewing-room
Diet kitchen
Linen-room
Store-rooms
Sink-rooms
Bath-rooms
Toilets
Laundry
Disinfecting room
Crematory
Morgue
Autopsy room
Heating plant
Workshop
Coal-storage

We take great pleasure in acknowledging the help so generously given by the members of the National Association and others, in collecting and arranging the information, plans, and photographs offered in this pamphlet.

THOMAS SPEES CARRINGTON, M.D.

SECTION I

Grouping of Sanatorium Buildings

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Grouping of Sanatorium Buildings

There has been a large amount of discussion as to the best method of grouping patients' quarters about the administration building of a sanatorium for the open-air treatment of tuberculosis. Some authorities contend that all lean-tos and other buildings for housing patients should be connected by covered passageways or corridors, while others feel that patients do better where they are compelled to go through the open air when walking from one building to another, as the patient is there to get fresh air, and the more he gets, the better.

A large amount of money has already been expended in building corridors. The superintendents of some institutions feel that the money put into corridors would have been much better expended if used in increasing the size or improving the buildings of the plant. Therefore the architect and engineer should carefully consider the climatic conditions of the locality before advising the expenditure of comparatively large sums in covered passageways.

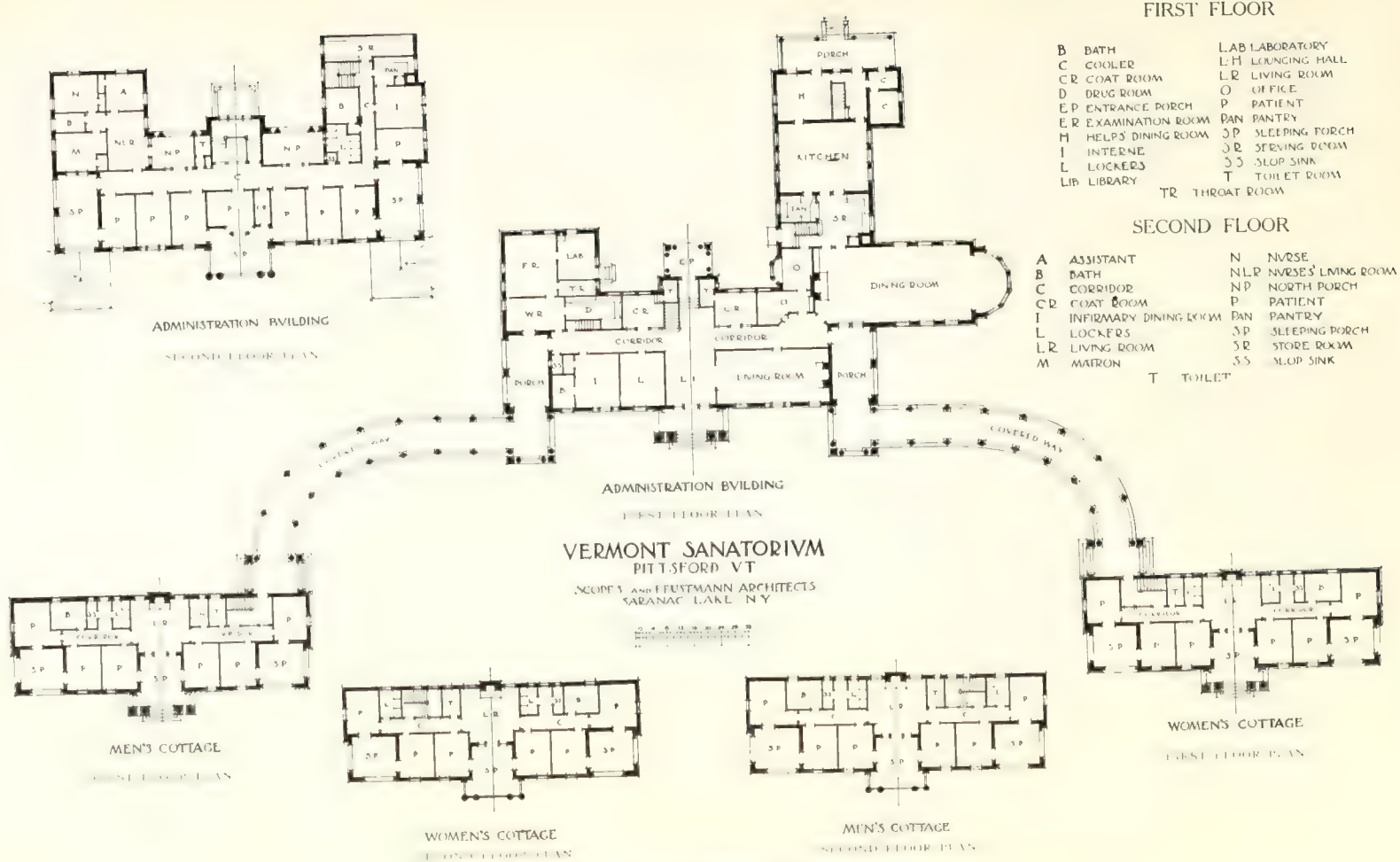
In the grouping of sanatorium buildings it has been suggested that the placing of structures for housing patients about the administration building should be more carefully planned, as it is usually impossible to overlook lean-tos and cottages placed behind or on the side of the main building. If the superintendent and physicians are to know what is going on in the different parts of the institution at all times, not only the buildings but the offices must be arranged for this purpose. With this idea in view lean-tos and ward buildings have been constructed on two sides of an angle, with the general sitting-room and nurses' quarters at the apex, but they have not been considered very satisfactory by some observers. It has been stated that cottages or lean-tos placed in a semicircle, with the administration building in the front and center, will bring all the porches under supervision when the offices are arranged in the rear of the main building.

An important point, and one that has very often been overlooked, is the placing of lean-tos or other buildings for housing the patients in such a manner as to give a pleasant and interesting outlook to the patient, who may be housed in a certain building for many months, sometimes extending into years. The comfort, pleasure, and contentment of the patient should always be carefully considered, and the question of holding patients at a given institution is daily becoming more important. Shacks, lean tos, and cottages where patients are often confined for weeks at a time with practically nothing to do, have been placed facing the back of some other building, or behind an obstruction to the view, when with a little care and foresight they might have been placed overlooking beautiful valleys or other interesting scenes.

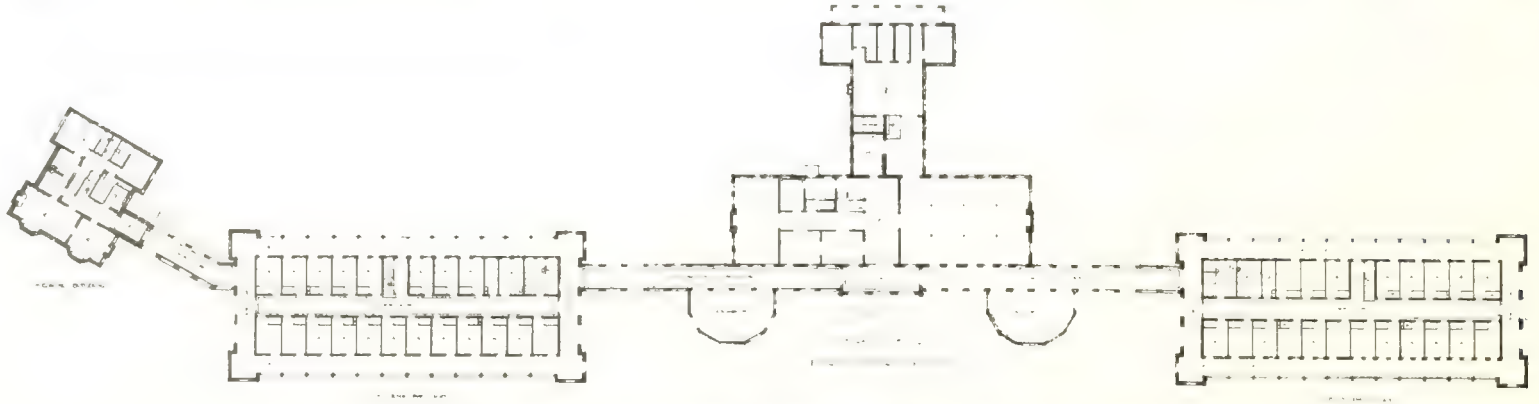
[illegible] toria are needed, but the open country offers a choice of sites which should be considered from this point of view. A sloping or hilly piece of land will be more desirable than a level one. Meadows and trees add to the cheerfulness of the landscape and a forest, preferably of pine, makes a good shelter. A great deal can be done by artificially improving the grounds where there is a lack of natural beauty, and in the selection of a site in bare country this should be planned for.

No. 1. Model of the Grouping of Wards & Nursing Accommodation Recently Adopted for the Leasowe Extension of the Royal Liverpool Hospital for Consumption and Diseases of the Chest.

No. 1. A view of Stockbridge Schools & Playgrounds. Architects' model of Mission of the Pilgrims, Quadrangle Dorms, and at the sides of the Administration Building.



No. 5 VERMONT SANATORIUM FLOOR PLANS



No. 4. Agnes Memorial Sanatorium, Decatur, Ga. — Grove & Walsh, Architects
Method of Grouping Buildings Along a Common Front

SECTION II

Administration Buildings

SECTION II

Administration Buildings

Some kind of a building for administration purposes is needed where tuberculous patients are housed. Many buildings have been planned for this use, but in making a selection of a particular design for any institution a number of points should always be considered. The most important of these is the size of the medical and nursing staff, and the kind of patients to be housed. Administration buildings for institutions admitting advanced cases require quarters for nurses and servants, special treatment rooms, and many apartments not needed when only incipient cases are to be cared for.

There are three ways of administering hospitals for tuberculous patients. The first is to provide a certain number of apartments for these purposes in the same building that houses the patients. The second method, and the one most in use at the present time, is an administration building with a number of lean-tos or cottages grouped about it. The third has only been used by large institutions occupying a wide acreage and housing more than 200 patients. A building is erected near the center of the sanatorium grounds for office and general administration purposes. The patients' quarters are divided into units with a capacity of about 150 beds each, and are grouped about a small administration building, containing a kitchen, dining-room, sitting-room, and other apartments needed by the patients. A number of such units may be placed at different points on the sanatorium grounds, and connected by telephone with the general administration building and each other.

In planning a sanatorium a good method to follow is to decide upon the number of rooms needed for administration purposes and the use they are to be put to; then design the administration building to house them, and build good, substantial buildings on lines that can be enlarged if necessary. It is believed that it is much more important to have a substantial, solid, and well constructed administration building than to build expensive quarters for patients, especially if only incipient cases are to be admitted. But rules cannot be made for building a sanatorium, as different problems must be solved for each institution.

Some sanatoria have cost as high as $4000 per bed, and there is a strong feeling at the present time that by careful study of local conditions where a new institution is to be erected and, by taking advantage of the experience gained in the work already accomplished, the cost of construction in the future can be materially reduced. The choice of building material and the plans used for the administration building will be a large factor in determining the cost per bed of the institution. As some of the best authorities have made the statement that institutions for the poorer classes of patients should be built for not over $400 per bed (this to include both the building and equipment), it is evident that the cost of the administration building must be low.

Usually one of the first questions considered for a proposed sanatorium is the method to be followed in housing the administration department. Economy in construction, durability of the structure, and ease of expansion as the institution grows should all be obtained and for these reasons many different plans have been tried. It has been suggested that a small group of buildings could be used for an administration centre and constructed for less

cost than the block type of building. This idea has not been carried out on a large scale, but in a number of instances a separate house has been erected for the superintendent and his family, and at some institutions the staff are housed in detached buildings. In some cases it has been found advisable to place the kitchen and service department on the top story and in others to build wide porches about the administration building. At all large institutions the administration building usually contains an amusement hall, or a separate pavilion has been built for games, lectures, and other entertainments. A plain one story building, well lighted and arranged so that it can be opened on all sides in pleasant weather and closed with glass when necessary, is very satisfactory for this purpose. (See illustrations, Nos. 5 and 6.)

The requests made by citizens to legislative bodies for funds to construct a public sanatorium is often answered by an appropriation of a small sum to start an institution as an experiment. Under these circumstances the size, cost, and plan of the administration building is a very serious problem. A start must be made in a small way, but with the expectation of enlargement as the knowledge for the need of such a hospital becomes apparent. In these cases the nucleus of a large administration building must be planned which can be enlarged as funds are appropriated. The method usually adopted has been to provide a large dining-room, kitchen, and sitting room in a building to which additions can be made. A good illustration of this plan is the front section of the Otisville administration building (Figs. 11–12).

At the Open Air Sanatorium in Portland, a structure of this kind has been built, but also includes bathing facilities for the patients, so that the fuel used for cooking will heat the water for the baths. The plan is very simple, with a dining-room 22 by 28 feet on the front, seating 42 patients. From this room opens a corridor, 5 feet wide, with bath rooms arranged on each side. This extends 18 feet to the rear, where a serving-room, 11 by 15 feet, a kitchen, 11 by 23 feet, and a nurses' dining room, 14 by 12, are housed in a separate addition, the dimensions of which are 28 by 40 feet, covering all.

There is a feeling growing among the superintendents of sanatoria that the best method of arranging the administration department in the larger institutions is to construct a separate service building which will house only the dining room, kitchen, and other rooms needed in this department. At the New Jersey State Sanatorium there is a separate service building containing a patients' dining-room, 35 by 53 feet, a doctors' dining-room, 13 by 23, a nurses' dining-room, 13 by 23 feet, a serving-room, a bakery and a storeroom. Another institution which is housing its service department in a separate building is the Massachusetts State Tuberculosis Hospital at Westfield, Mass. The main portion of this building is one story high, 61 by 80 feet; divided into a dining-room, 38 by 61 feet, a nurses' dining-room, 14 by 24 feet, a servants' dining-room, 12 by 23 feet, a kitchen, 36 by 40 feet, and a bakery, 10 by 14 feet. From this extends a wing to the rear three stories high, 63 by 88 feet. On the first floor of the wing is the laundry and servants' sitting-room; on the second and third floors are sixteen chambers for the servants.

Large institutions usually build a power plant in connection with the administration building, and this when possible should be placed near a railroad station, and a siding ought to extend to the building and over the coal bunkers. In the plant is generated all the power, light, and heat for the entire group, and from there distributed to all the buildings. In some hospitals the power building also contains the laundry, work-shop, morgue, and in the upper story, dwellings for employees.

The mechanical plant requires a boiler, arranged in duplicate units if possible, the horse power capacity depending upon the size of the institution; an electric generating plant, also in duplicate units, with the necessary engine, pumps, and other apparatus. The

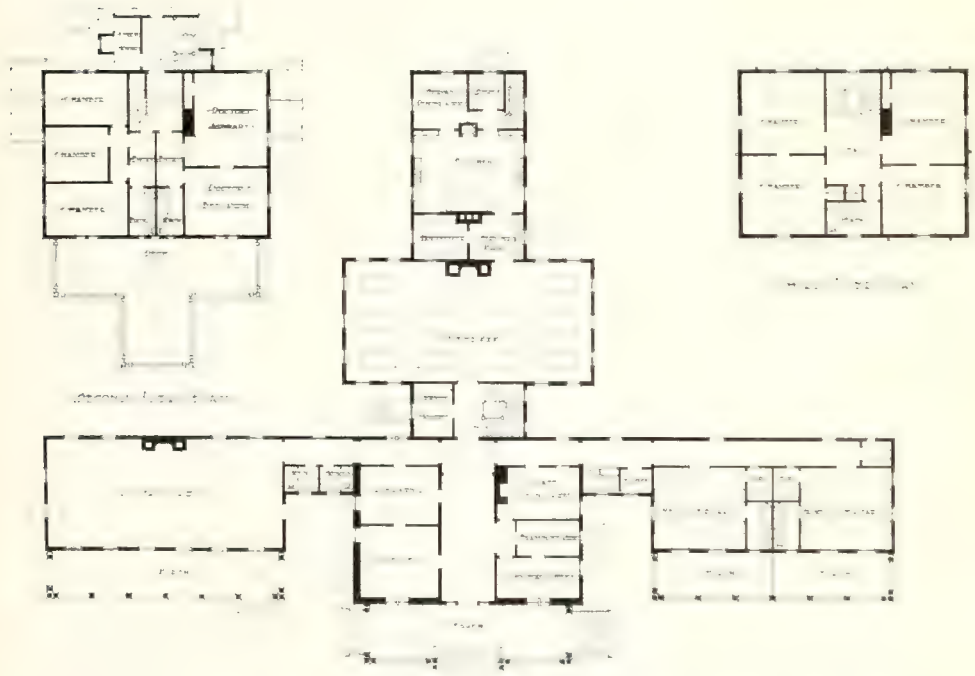
electric current must be great enough for general lighting and water-pumping, if needed, a refrigerating plant, laundry, and other power required. The exhaust steam can be arranged to supplement the heating plant for the buildings and the generation of service hot water.

In starting many institutions the construction of a power plant or the installation of a sewage disposal system is impossible with the means appropriated, and still a site should be selected with a view to adding them ultimately. This does not mean that good work cannot be done without these accessories. Some of the best known institutions are today using separate heating arrangement in each building, and it is said that a boiler for a steam or hot-water system or a furnace in the administration building and in the wards for advanced cases, with stoves in the dressing- and sitting-rooms of the lean-tos for incipient cases, cost less money for installation and are cheaper to maintain.

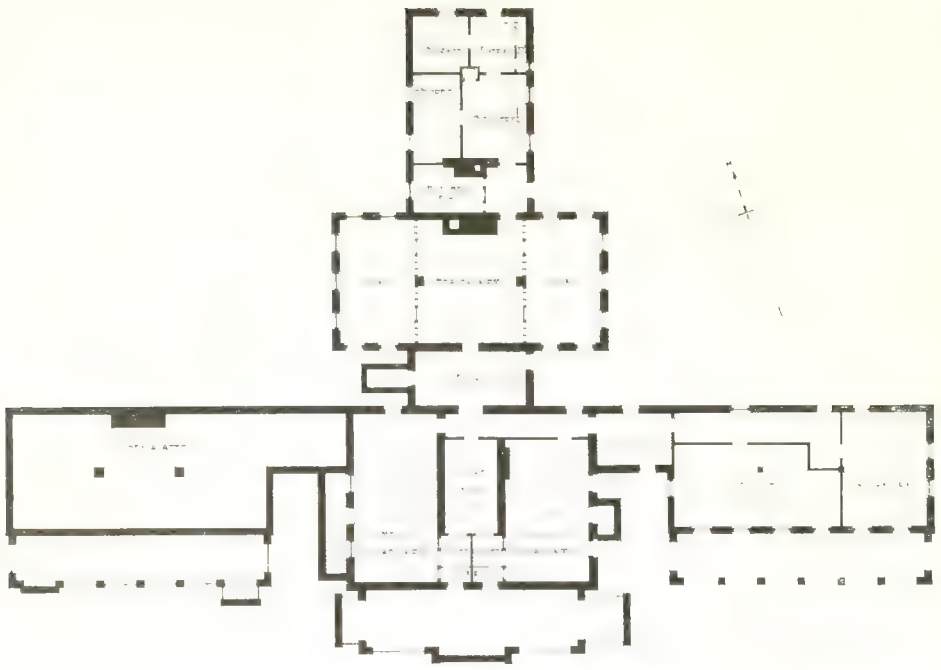
Where the water-supply is below the buildings, a pumping plant must be installed. The water can be forced from springs, or other supply, to the top of a hill or elevated tank above the hospital group. This elevation should be sufficient to give a strong, continuous pressure, which will distribute the water to all the buildings and to fire-plugs throughout the grounds. For this water a reinforced concrete reservoir can be constructed, and is usually satisfactory if there is a natural elevation near the sanatorium buildings. The size of the reservoir depends upon the number of persons to be housed in the institution; a generous provision for each individual being about 100 gallons per day. To this should be added an allowance for each animal kept on the premises, watering roads, sprinkling lawns and storage ready for use in an emergency. Usually in a sanatorium for 50 patients an estimate is made for a storage capacity of from 50,000 to 200,000 gallons, depending upon the amount of water to be stored for dry seasons. The reservoir can be placed in the most convenient position available, without fear of obtaining greater force than is needed, as the pressure is greatly reduced by the friction in the pipes when water is carried any distance. Where water cannot be stored in this way, either a tower should be built about 60 feet in height with a tank placed at the top, or one of the systems of water-supply using a pressure tank underground installed near the building.

When the connection with a city sewerage system is impossible, a plant for the collection and disposal of the sewage will be required. A septic tank and a subsoil distributing field is not very expensive, and should always be installed for large institutions. There are many ways of disposing of the waste material of a small sanatorium. Earth closets, if carefully attended to, are considered sanitary, particularly in dry climates, and slop water, being a good fertilizer, can be collected in underground tanks if the storage receptacle is made absolutely tight. Collecting tanks of this kind must be emptied frequently and their contents spread over a large garden or farm-land where it will dry quickly and will not be dangerous or disagreeable. This can be done either by a pump or through a gravity pipe when buildings are erected upon sloping ground. Cesspools should not be used under any circumstances, as they are unhygienic and will give trouble by causing the ground around the buildings to become foul.

No. 5.—Eudowood Sanatorium, Maryland. Administration Building with Recreation and Infirmary Pavilions. Archer & Allen, Architects. Estimated Cost, $[illegible].



No. 6.—Eudowood Sanatorium. Administration Building. First, Second, and Third Floor Plans.



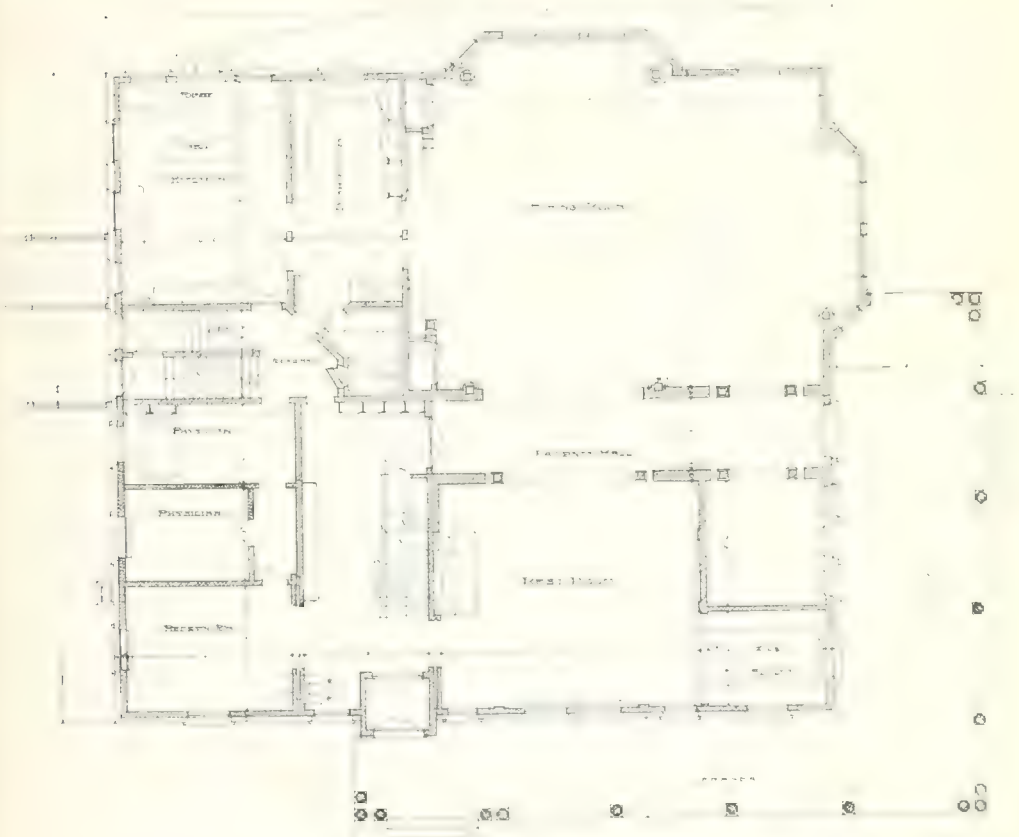
No. 5. Eldowood Sanatorium. Administration Building. Foundation and Basement Plan.

Eldowood Administration Building (illustrations 5, 6, and 7), 183 feet along the front, was remodeled, rebuilt, and greatly enlarged in 1918, only a part of the old building having been retained as a nucleus, and even this was entirely rearranged. The additions made consisted of two large wings, both 24 by 52 feet, one being designed for the housing and care of the patients and the other for a recreation hall. A third large wing was added to the back of the original building, providing a spacious, well lighted dining room, 35 by 54 feet, pantry, and kitchen, 24 by 41 feet, the whole improvement resulting in a group of buildings extending from one center and admirably adapted to the requirements. There was also installed a central hot water vacuum plant of sufficient size to heat the entire structure. These improvements have doubled the previous capacity and enabled the institution to provide greater ease and comfort for the patients at a cost of about $50,000.

One of the advantages of constructing an adminstration building with the dining-room and kitchen in the rear and only connected by a passageway is that the patients can enter and use this portion of the building at the rear of the offices, which prevents the tracking of dirt and mud through the house and cuts off the noise usually made by a large number of people dining together.

The Administration Building of the Iowa State Sanatorium (illustrations 8, 9, and 10) is a substantial, brick-veneered structure, 63 by 70 feet, housing offices, general dining-room for all patients, kitchen, and living-room for officers and employees. The basement contains storage rooms and a dining-room for the male help. The first floor has three medical offices, with a laboratory and drug room, kitchen, and dining room, 30 by 40 feet, that will seat 125 people. There is also a large rest room, 22 by 25 feet, and on the second and third floor quarters for nurses and rooms for other help. The building complete cost $23,000; but this does not include the laundry and heating plant, which are housed in another structure.

No. 8.—Iowa State Sanatorium. Administration Building. H. J. Liebel, Architect. Estimated Cost, $23,000.



No. 9.—Iowa State Sanatorium. Administration Building. First Floor Plan.

No. 11.—Iowa State Sanatorium.—Administration Building.—Second Floor Plan.

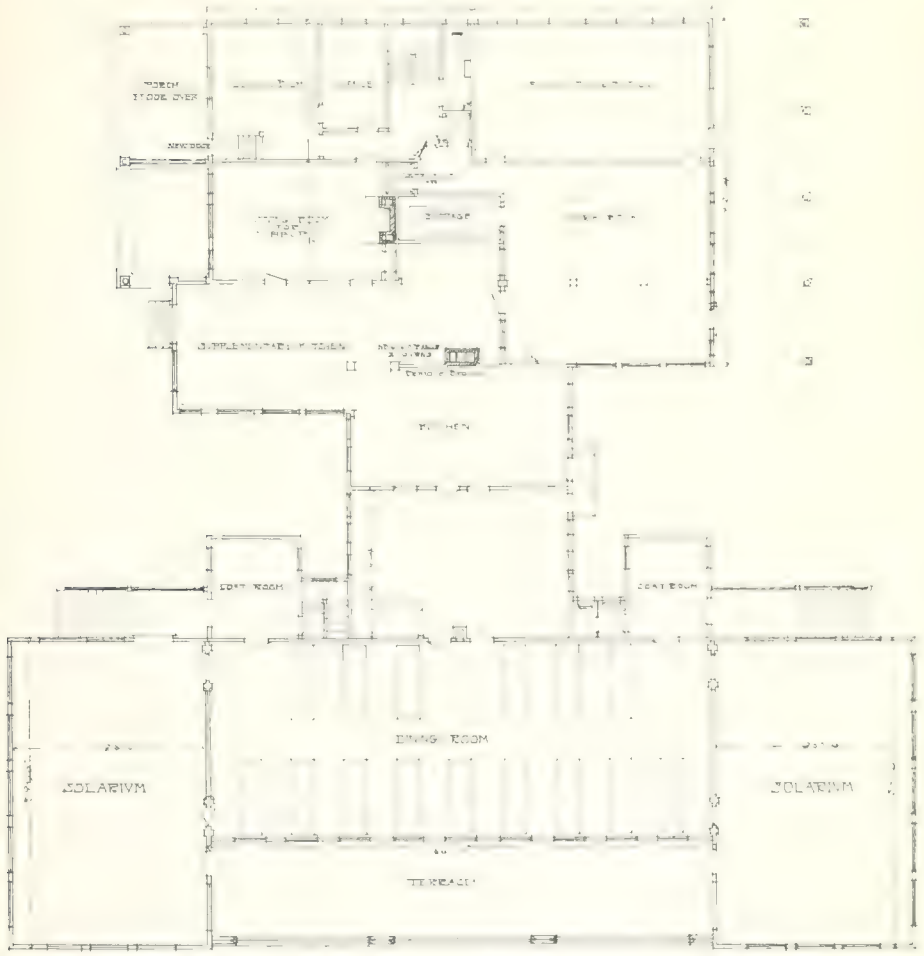
The Administration Building at Oakville, illustrations 11, 12, 13, and 14, was planned to be the center of one group of lean-tos and cottages in a large institution made up of a number of units. Each unit is to house 150 patients, and all the groups are to be administered in a general way from a central administration plant situated about equidistant from them all. The building illustrated is the administration plant for the first men's unit and contains, besides a large, commodious dining-room and kitchen, two sun parlors and a well-arranged infirmary, nurses' and servants' quarters.

The building is placed on the side of a hill, where the drainage is good, and has a large, well-lighted basement under the lower end. The foundation, constructed of stone, extends to the first story, and as very little excavation was necessary the front basement is mostly above the ground, well lighted and warm. This gives practically an extra story, and is to be used as a bathing apartment which will contain a variety of shower-baths and other modern bathing fittings.

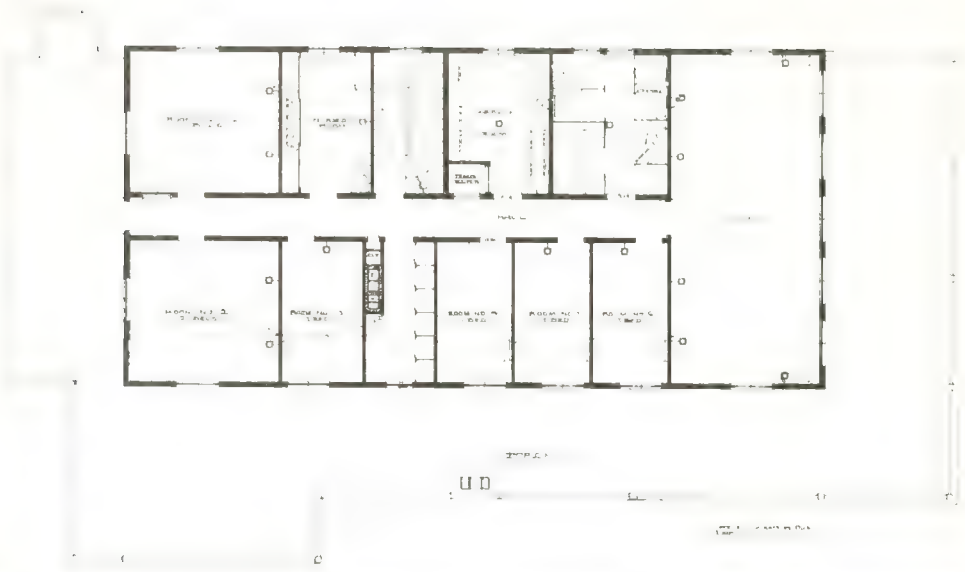
The building is divided into two parts connected by a passageway 26 feet wide and 35 feet long which is used as a kitchen and serving room.

The front section has one story over the basement of frame construction covered with shingles and is 116 feet long by 40 feet wide. It is divided into one large dining-room in the center, 67 by 24 feet, seating from 120 to 150 persons. At each end of this room is a solarium 30 by 25 feet and used for amusement and reading purposes. A large open space in front of the building, called the terrace, is connected with the sun parlors. These three apartments

No. 11.—Otisville Sanatorium, New York. Administration Building for Men's Unit. Cost $35,000. Designs of the Department of Health; John V. Van Pelt, Architect.



No. 12.—Otisville Sanatorium. Administration Building for Men's Unit, First Floor Plan.



No. 14.—OLYMPIC SANATORIUM.—ADMINISTRATION BUILDING FOR MEN'S UNIT, SECOND FLOOR PLAN.

can all be protected in bad weather by glass and sash windows, which are usually pushed up and out of the way, leaving the openings entirely clear.

The rear of the building is for all practical purposes a separate structure, 66 feet long by 32 feet wide, with a large, open veranda on two sides upon which beds can be rolled both from the ward and the private rooms facing the porch. As the hill at this point has a steep slope, the floor of the first story is close to the ground and contains the storage and work rooms and other apartments needed for administrative purposes.

The second floor is used as an infirmary and is divided through the center by a long hall 4 feet wide, and at one end opens into a ward 27 feet by 60 feet. The space on each side of the hall is divided into nine rooms which are used for one or two patients each.

The third story, under a slanting roof, is cut up into two dormitories, four single rooms, toilets, and closets for the use of the servants.

SECTION III

Administration Buildings and Patients' Quarters Combined

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Administration Buildings and Patients' Quarters Combined

This section illustrates and describes only two institutions that combine the apartments for administration purposes and patients under the same roof. It is believed to be the opinion of the majority of those who have had experience with such buildings that it is not wise to house tuberculous patients in this way. When economy is necessary and buildings which can be remodeled are already on the site, this method of housing may have to be adopted, but where a new institution is planned, patients should be placed in separate quarters.

Some of the reception hospitals at large institutions are built on the plan of a complete unit, and house both the administration arrangements and patients' quarters under one roof. The plans of THE RECEPTION HOSPITAL AT SARANAC LAKE and THE MARY LEWIS RECEPTION HOSPITAL AT THE LOOMIS SANATORIUM have been published and are readily obtainable. These buildings are beautifully finished, and are fine examples of reception hospitals but are expensive and therefore have been omitted from this work.

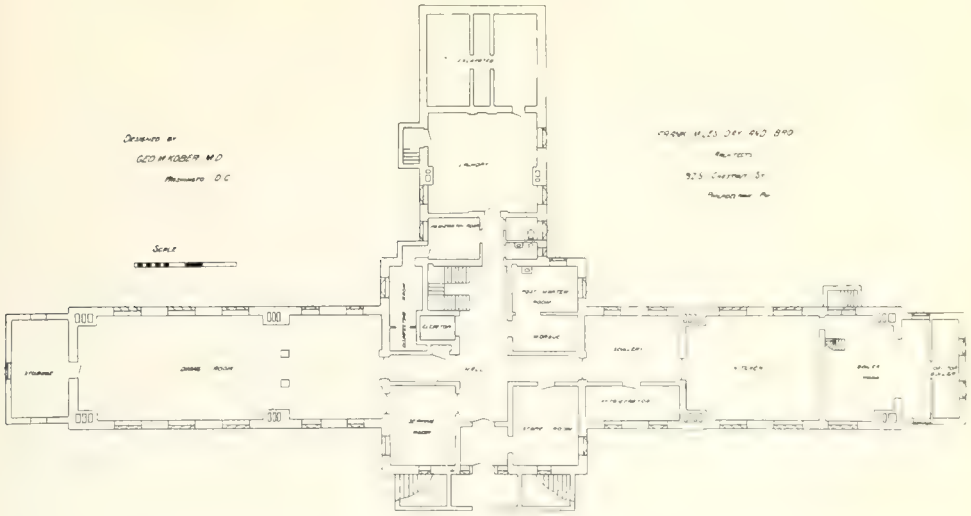
THE SANATORIUM AT SHARON, MASS. (illustration 15), which is planned as a combined administration building and patients' quarters, is one of the oldest buildings constructed for the open-air treatment of tuberculosis in America. Its continuous use for fifteen years has demonstrated its convenience for this purpose. Any one planning to build a sanatorium and desiring to have a complete unit under one roof, on a property where a farm-house or country residence is already in existence, can use the structure for administrative purposes and add an extension on one or both sides designed after a plan of the patients' quarters of the Sharon building. These extend from the dining-room and include the sun parlor, with toilets, baths, and closets, in the rear of the hall. This method of construction will give a complete and comparatively cheap sanatorium building, as the patients' quarters can be built in an economical way. The sleeping porch is wide enough to give plenty of room for the patients to move around at the sides of the beds, and is protected, when necessary, from the sun and rain by a canvas awning which can be rolled up out of the way, leaving the porch uncovered. The doors from the private rooms opening on the porch are made wide enough for the beds to pass through them.

THE TUBERCULOSIS HOSPITAL AT WASHINGTON, D. C. (illustrations 16, 17, 18, 19, and 20), has been given space in this pamphlet to illustrate all the floor plans, as it was built at a remarkably low cost, and is interesting in the way it is planned to house advanced and incipient, white and colored, male and female patients, each group in a separate wing or on a different floor of the hospital. The building is a substantial brick structure, has a commodious electric elevator, and is well finished throughout. It has a capacity of 120 beds and cost $100,000 to erect and furnish, which is an average of $833 per bed. The hospital is planned to provide accommodations for white and colored males who are in the second and third stage of the disease, in separate wards on the first floor. The second floor is arranged for white and colored females in the same manner. The incipient cases of both sexes and colors are housed in open-air wards on the third and fourth floors. These open wards or roof gardens have casement windows on the north, but are entirely open on the east, south, and west sides.

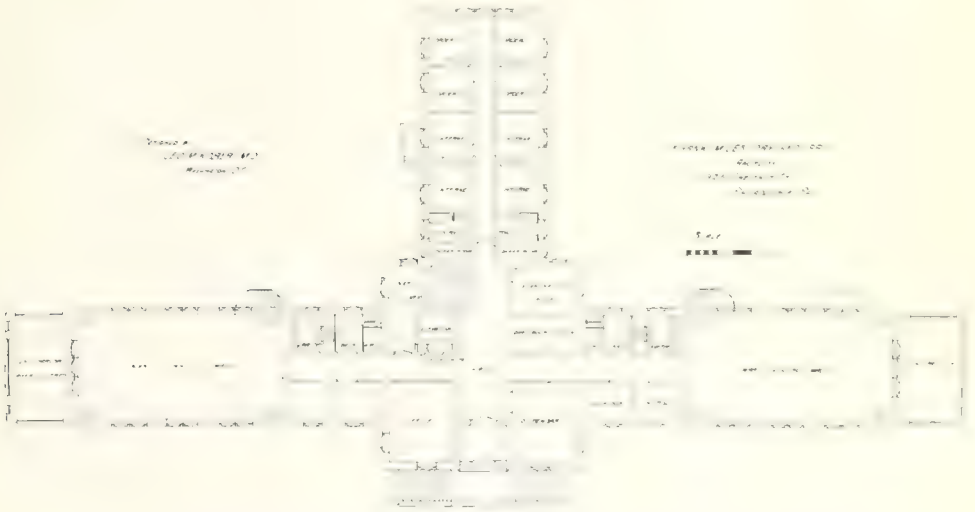
It is claimed for this style of building that it is possible to economize on the installation of the plumbing, heating, and administrative arrangements, and that it concentrates the work, and is particularly good for city use, as the 8000 square feet of floor space which is provided could not be obtained at a reasonable cost for the erection of one-story lean-tos or cottages spread over a large area of ground where property is valuable.

No. 15. SHAW SANATORIUM, SHARON, MASS.

No. 16. Tuberculosis Hospital, Washington, D. C. Designed by Dr. George M. Kober. Frank Miles Day & Bro., Architects. Capacity, 12 Patients. Cost of Construction and Equipment, $



No. 17.—Tuberculosis Hospital, Washington, D. C. Basement Floor Plan.



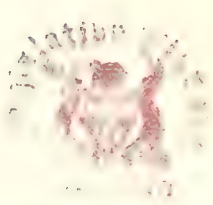
No. 18.—Tuberculosis Hospital, Washington, D. C. First Floor Plan.

A careful study of the arrangement of the wards, noting the allotment of floor space to the different classes of patients, is interesting. The length of the building along the front is 210 feet by 25 feet wide through the wards and 50 feet through the center. The side extensions are 82 feet long and the rear extension on the upper floors is 50 feet long, but as it runs into the side hill it has not been excavated the entire length in the basement. The basement contains a large dining-room, kitchen, store rooms, boiler room, refrigerator, postmortem room, and morgue. The arrangement of the first and second floors is the same, the side wards being 48 by 25 feet, the sun parlors 25 by 14 feet, and the rest of the floor space divided into rooms for offices, toilets, diet kitchen, and the other accessories used in a general hospital.

Second Floor Plan

Third and Fourth Floor Plans

The third floor has three large open-air wards, one in each wing, 71 by 24 feet, and one over the entire rear extension, 57 by 25 feet. The center of the building is divided in much the same manner as the lower stories, but the rooms are used by the patients for toilets, baths, and dressing. Over the main part of the building on the fourth floor is an open-air ward, 28 by 44 feet, with toilets, baths, and dressing-rooms opening into it from the rear. The interior finish of the whole building is in hard wood, giving a good substantial appearance. The institution is well worth a visit, not only because of its unique arrangement, but also because it will offer many suggestions to those who have to solve the problem of housing patients in large, congested cities.



SECTION IV

Patients' Quarters—Lean-to Type of Building

SECTION IV

Patients' Quarters—Lean-to Type of Building

There are three sections in this pamphlet given to illustrating and describing patients' quarters. Many of the buildings have developed from suggestions made by Dr. Charles S. Millet and Dr. Herbert M. King on open-air housing.

This section is a study of the growth and changes made in the lean-to. Many modifications have tended to increase the capacity rather than to change the type. In some instances the expansion has been upwards, while in others the porches have been lengthened. This type of building lends itself to cheapness of construction, and has proven very serviceable and comfortable both when put up in a rough way for incipient cases and when well constructed and finished on the interior for advanced cases.

Consumptives in the early stages of the disease bear excessive cold well, and therefore expensive sash and glass windows or doors inclosing open-air shacks are in many cases unnecessary. The objection made to cheap cottages and lean-tos is that they are not substantial, permanent buildings, and although that may be true, a structure costing $1500 and giving ten years' service can be torn down and rebuilt on the same line a number of times for less money than it costs to erect a permanent structure which may become useless and out of date.

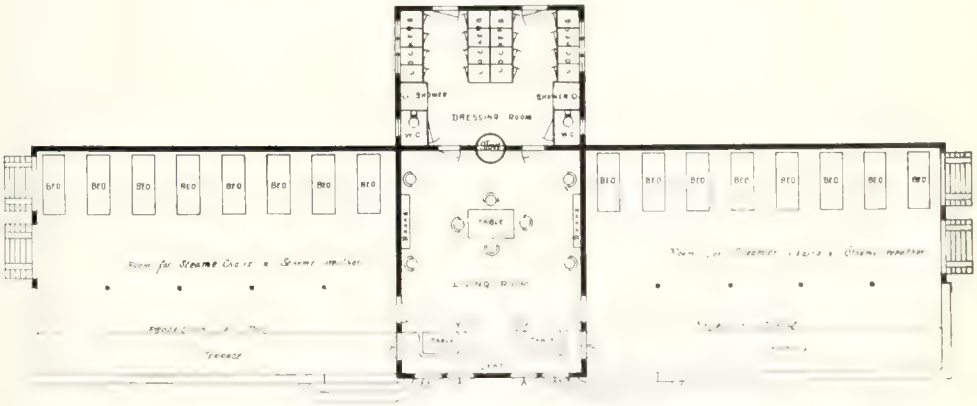
Good results are obtained in buildings having no plumbing or heating arrangements. The patients use the ordinary wash bowl and pitcher, or go to a small central building where the toilet, washing, and bathing facilities are concentrated. The question of putting plumbing in cheap buildings is important, and should be carefully considered in a northern climate, as the trouble produced by frozen pipes during the winter may in the end cause the pulling out of the pipes or the expense of heating the building. Patients seem to do as well in shacks, where there are no heating arrangements, as they do in the most expensive buildings. In some large sanatoria, where expensive heating plants have been put in, the heat is only turned on a few times during the winter months.

A locker for each patient, large enough to be used as a private dressing-room, should always be provided even in the cheapest buildings.

Ventilation is one of the most important questions to be considered when constructing quarters for patients. Even lean-tos with open fronts are often as badly ventilated as rooms inclosed by four walls. At times the air of the porches becomes full of foul odors where cross circulation is not obtained. Ventilation means circulation of air, and to produce a current, even in an open lean-to, needs special planning which has sometimes been forgotten. Most lean-tos have windows cut in the sides and rear to produce this current, and others are also fitted with windows above the porch roof, which removes the foul air close to the ceiling. One of the Canton Hospital School Wards (illustrations 59 and 60) shows a method used in some of the Massachusetts institutions for ceiling ventilation.

Lean-tos should always be built with plenty of porch space in front of the building to give room at the end of the beds for patients to move about freely.

No. 21. Loomis Sanatorium, New York. Original Improved Lean-to Designed by Dr. Herbert Maxon King. Cost, $1830.



No. 22. Loomis Sanatorium, Original Improved Lean-to, Floor Plan

The idea of housing tuberculous patients in lean-tos, so widely used to-day, was initiated by Dr. Herbert M. King, of Loomis Sanatorium, and originated in a little building for eight patients, which he planned and his sanatorium carpenter put up in 1904 at a cost of $580, or $72.50 per patient.

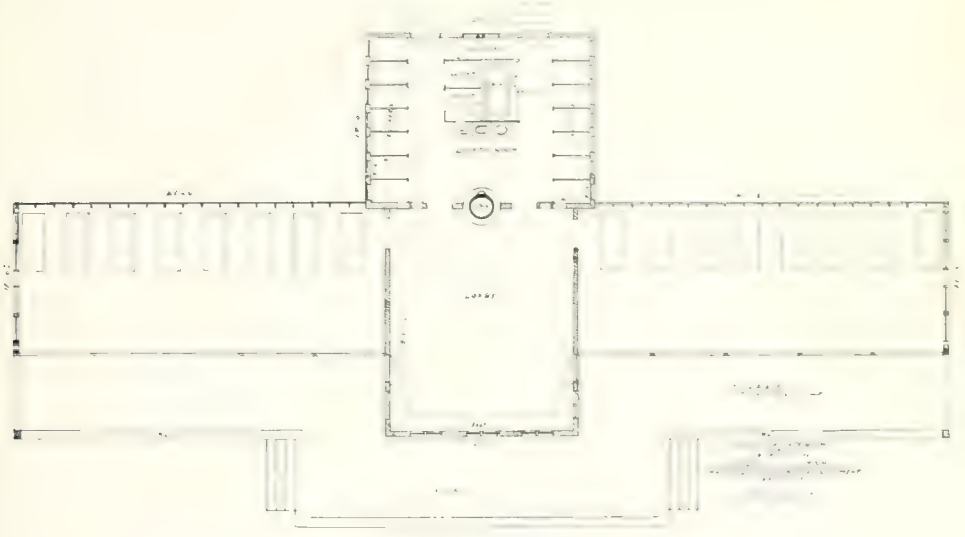
No. 21.—Lincoln Sanatorium. Original Improved Lean-to. View of Porch Showing Simplicity and Great Ease of Construction

This building is still in use, but The Improved King Lean-to (illustrations 21, 22, and 23) is the building which has been copied so often. It consists of two lean-tos connected by a sitting-room. This room and the double locker-room directly back of it are heated by a large stove, which also supplies hot water for the baths and hand basins. The interior finish of the center apartment is hard pine, filled and varnished; the exterior of the building is covered with cedar shingles and left to weather-stain. Smooth surfaces are painted, with the exception of the floor which, where exposed to the rain, is laid of three-inch material with one-half inch spacing. The surface of each floor plank is slightly rounded, to prevent curling.

A glance at the illustration of one of the porch interiors will give an idea of the simplicity and cheapness of construction. The 2 by 4 timbers supporting the walls and roof are left uncovered. These can be planed, painted, stained or left in the rough, according to one's taste and need for economy. The exposed boards upon which the shingles are laid can also be treated in any of these ways, and by leaving this lumber unfinished quite a saving can be made. The building should face the south, and when so placed a canvas curtain which can be lowered during storms will be sufficient protection for the patients.

The length of the porches is 40 feet; the extent of the roof projection is 20 feet, which is a great help in keeping out a driving storm. The total length of the lean-to is 100 feet and the width of porch, including space not protected by the roof, is 25 feet. The rear extension is 15 feet deep by 20 feet wide.

No. 24.—Michigan State Sanatorium. Lean-to. Malcomson, Higginbotham & Clement, Architects; Cost, $4500. Capacity, 16 Patients.



No. 25.—Michigan State Sanatorium, Lean-to, Floor Plan.

The lean-to type of structure used at Howell, Mich. (illustrations 24 and 25), has a plan similar to the King lean-to, but the arrangement of locker, toilets, and baths is somewhat different. The entire building is better finished and more substantial, having glass and sash windows to inclose the front. Its dimensions are 102 by 25 feet and the rear extension is 19 by 25 feet. The capacity is the same as Dr. King's structure, but the cost per patient was higher, as the large terrace in front, more commodious dressing-room, and other improvements brought the cost of construction to $4500.

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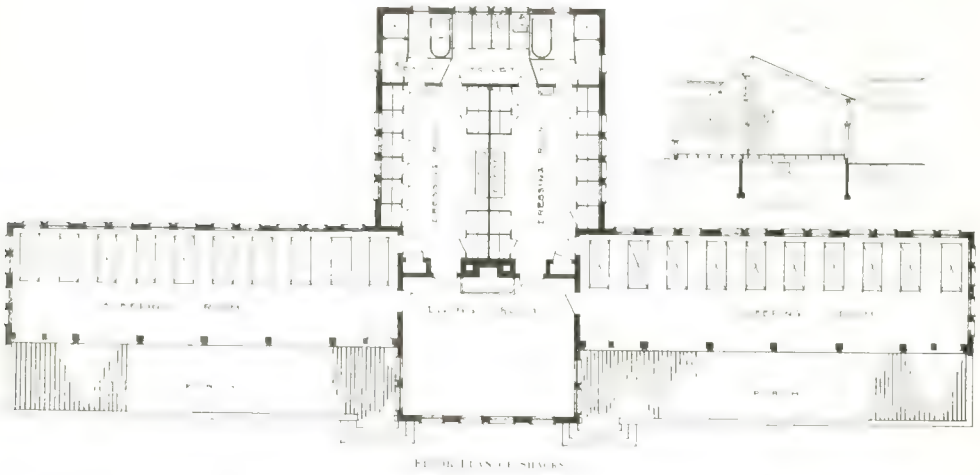

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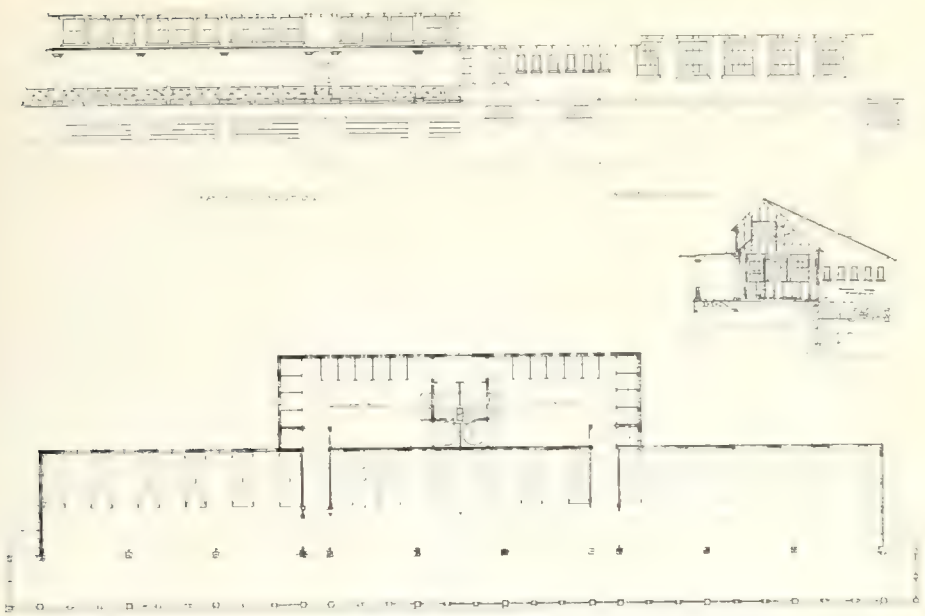
The Lean-tos at the Maryland Tuberculosis Sanatorium (illustrations 26 and 27) are grouped about the administration building as shown in Section I, and are all alike with the exception of the finish. They are of frame construction, housing 22 patients on two porches 56 by 5 feet. The sitting room is 22 by 18 feet, and the dressing room is fitted with toilets and baths, and is 14 by 12 feet. The lean-tos face the south and every room has cross air and light from opposite sides. The porches have a number of windows in the rear and side walls, and between the columns in front are large sliding sashes. When these are pulled down, the rear of the porches becomes a closed ward intended for use in bad weather. Each patient has a private dressing alcove containing a set of drawers and hang-

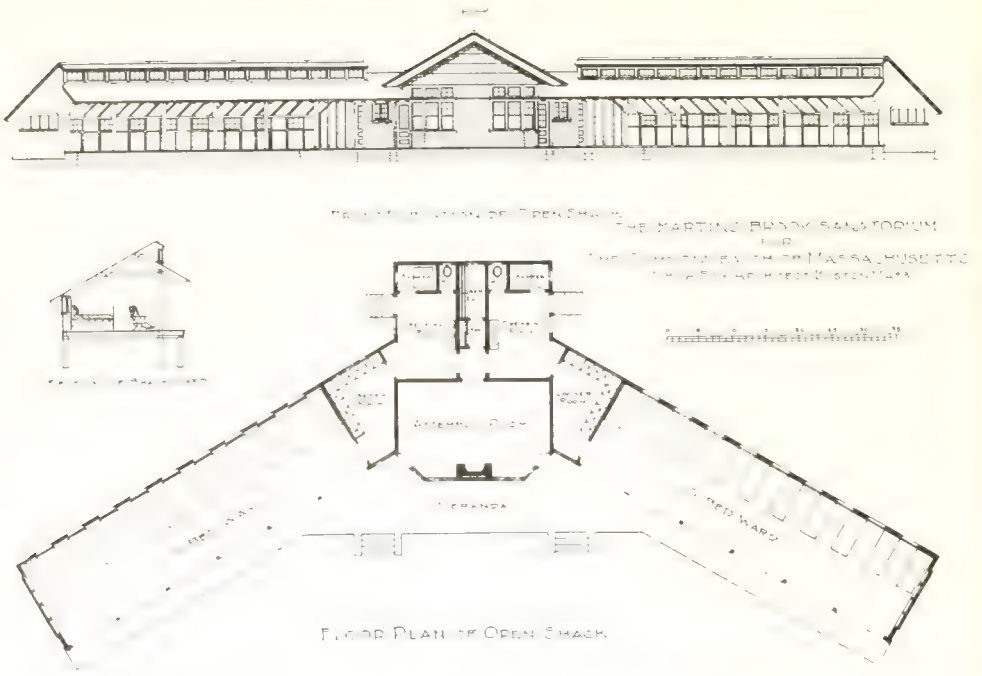


No. 28.—Otisville Sanatorium, New York, Lean-to for 18 Patients; Estimated Cost, $4400. Designs of the Department of Health; John V. Van Pelt, Architect.

ing space for clothes. Ample bathing facilities are provided, as well as toilets and lavatories. These buildings were constructed for about $7000 each. The high cost is partly due to the sliding sash windows and to the fine interior finish of the porches, which are ceiled with selected boards or plastered.

These lean-tos were built to house incipient cases, and are intended for the open-air treatment and cure; but they are so well constructed and arranged that they would make good wards for advanced cases. Institutions such as small town or county hospitals which need an isolated ward for advanced tubercular cases can put up a lean-to on this plan and finished in the same way for a comparatively small outlay.

The Lean-to at the Otisville Sanatorium (illustration 28) is 105 feet long by 18 feet wide and has a housing capacity of 18 patients, with an unobstructed view of the whole porch from either end. There are two dressing-rooms with separate entrances from the porch, which gives a long, narrow appearance to the rear extension. This is 42 by 10½ feet and is divided into two dressing-rooms by a partition and has no connection from within between the two rooms. There is a small cellar excavated under the extension supplied with a furnace for heating these apartments, but the building has no sitting-room, and so should be placed near some other structure having an apartment for reading and amusement. The front and side elevations show the windows for ventilation below the main roof and above the projecting roof of the front porch. This is a peculiar feature of the building which is quite different from the usual lean-to design. The break in the roof projection causes an increase in the cost, but is one of the methods of ceiling ventilation often necessary in open-air buildings.

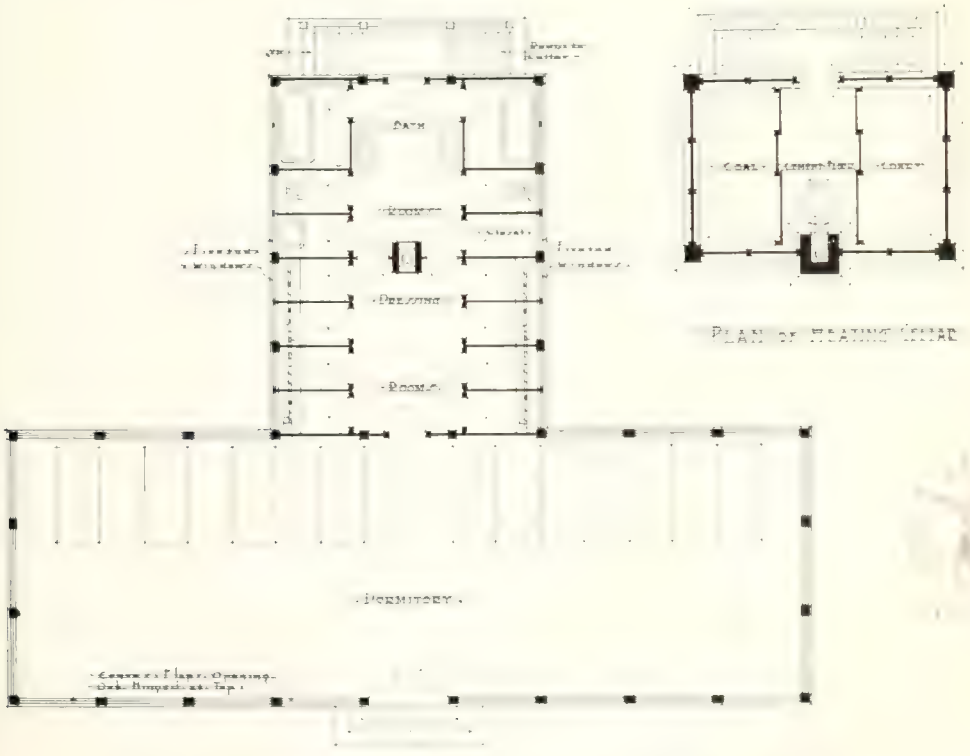


No. 29.—Martins Brook sanatorium, Mass., Lean-to for 2 Patients. John V. Fox, Architect; Cost, $33[illegible]—$175 per Patient.

The Lean-to at Martins Brook Sanatorium, North Reading, Mass. (illustration 29), is designed so that both the porches can be overlooked from the sitting-room. The length of these wings is 67 feet on the rear and 58 feet on the front, with a width of 19 feet including the veranda. The locker-rooms are placed at the inner ends of the porches so as to utilize the space of the angles made where they join the center apartment. The sitting- and dressing-rooms cover an area of 33½ by 24 feet, and give more room for these purposes than in a building with a straight front. There is a break in the roof of the porch for ventilation somewhat different from Mr. Van Pelt's plan at Otisville, but serving the same purpose. The veranda in front of the sitting-room extends to the end of the wings, and is a feature to be noticed, as it adds materially to the floor space that can be used in good weather. The building cost $3500, and is one of four, all alike, put up in connection with other buildings for the new sanatorium built by the State Commission in Massachusetts.

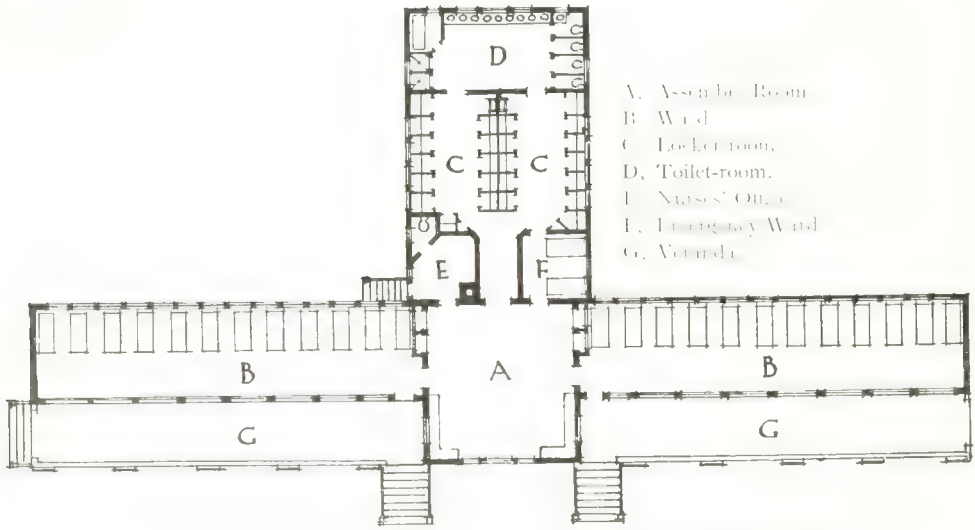
The Lean-to or Garrett Pavilion at Eudowood (illustrations 30 and 31). The front consists of one large room, 55 by 19 feet, which is used for sleeping and living purposes. This opens into a rear extension, 24 by 19 feet, under which is excavated a small cellar for the heating plant. The lockers are 3 by 5 feet, large enough to make a small private dressing-room for each patient, and are lighted by windows swung on a pivot. They are close to the toilets, baths, and wash-basins, making an unusually comfortable and convenient apartment which will give many suggestions for those wishing to design an extension to the lean-to type of structure. The exterior of the building is attractive and arranged to receive the light and air from all sides. The open spaces for this purpose are fitted with canvas flaps to be used for protection in stormy weather.

No. 30.—Eudowood Sanatorium, Maryland. Lean-to. Archer & Allen, Architects; Cost, $4000. Capacity, 8 Patients.



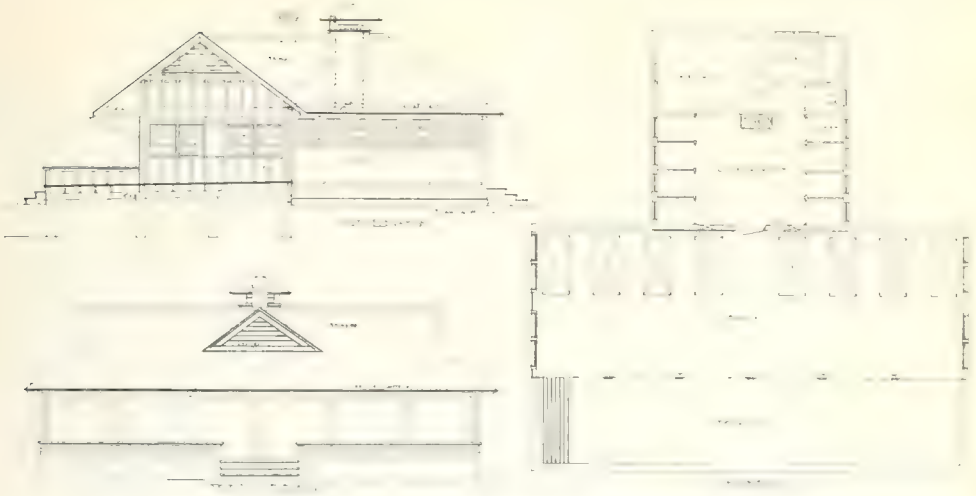
No. 31. Eudowood, Lean-to, Floor Plan and Heating Cellar

No. 32. Boston, Mass. Consumptives' Hospital. Cottage Ward for 24 Patients. Maginnis, Walsh & Sullivan, Architects. Cost $[illegible]



No. 33. Boston Consumptives' Hospital. Cottage Ward. Floor Plan.

The Cottage Ward of the Boston Consumptives' Hospital (illustrations 32 and 33) was designed for advanced cases, which accounts for its high cost of construction. The central portion comprises an assembly room, locker room, two shower-baths, a tub-bath, six lavatories, and four toilets, an emergency ward of two beds, a linen room, and a nurses' office. The wards are 60 by 18 feet, and each contains a single row of 12 beds

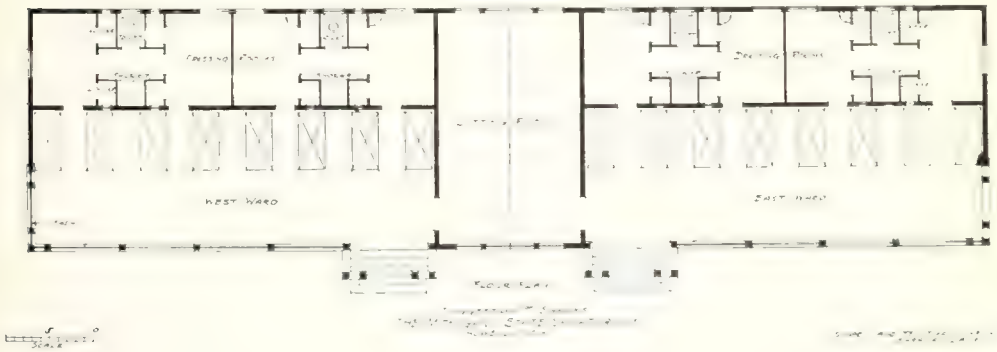


No. 34.—The Detroit, Mich., Board of Health Lean-to; Malcomson, Higginbotham & Clement Architects; Cost, $2000. Capacity, 8 Patients.

Along the entire front of each ward is a wide veranda separated from the wards by a glass partition of triple-hung windows extending from the roof to the floor. Along the north side of the ward is a row of windows four feet from the floor. The walls are plastered, and the floors are of first quality maple. It is heated by steam and lighted by electricity. The total cost, including equipment, was about $15,000.

The little pavilion for The Detroit Board of Health (illustration 34) is 47 feet long by 16 feet wide and has a veranda beyond the roof supports, 10 feet wide. The extension in the rear is 21 by 21 feet, and contains a nurses' room in addition to the usual locker and toilet facilities. This lean to has a floor plan very much like the Garrett pavilion, but has the addition of a broad veranda partially unprotected by the roof in front. It is of cheaper construction and has no heating plant, but is convenient and the capacity is the same—housing eight patients. The cost for building is $2000.

The floor plan for a lean-to (illustration 35) should be noticed, as it has no rear extension, and so can be built on a site where an extension in the rear would be inconvenient.



No. 35.—A Floor Plan Suggested for a Lean-to at the Michigan State Sanatorium; Scopes & Feustmann, Architects; Estimated Cost, $3500. Capacity, 16 Patients.

No. 36. Iowa State Sanatorium. Pavilion for 40 Patients. H. F. Liebig, Architect, Cost, $8000. 24 by 240 Feet.

No. 37. Iowa State Sanatorium. Pavilion for 40 Patients. Front Elevation.

No. 38. Iowa State Sanatorium. Pavilion for 40 Patients. Floor Plan.

The Pavilion at the Iowa State Sanatorium (illustrations 36, 37, and 38) housing 40 patients, is 240 feet long by 24 feet wide, and includes a central section 24 feet wide by 32 feet deep. In the center apartment are rooms for nurses, a diet kitchen, toilets and baths for both sexes. Each wing contains 10 rooms, 10 by 12 feet in size, and furnished with two lockers and two beds. The veranda is 12 feet wide, and is inclosed with wire netting as a protection against flies and mosquitoes. Each room has a radiator heated by a hot-water system connected with pipes under the whole length of the building. There are windows in the rear walls of the rooms, and transoms in the front above the veranda for ventilation. The total cost of construction was $8000, or $200 per bed.

SECTION V

Patients' Quarters—Infirmaries and Buildings for Advanced Cases

SECTION V

Patients' Quarters—Infirmaries and Buildings for Advanced Cases

In large cities where there is a working connection between a hospital for the cure of advanced cases and an open-air sanatorium for the cure of incipient consumption it has been found that there is more or less interchange of cases between the two institutions. The patients taken into the hospital for advanced cases, to be cared for until they die, often improve under nursing, good food, and hygienic surroundings, and are then sent to the open-air sanatorium, while certain patients sent to the sanatorium seemingly only incipient cases, gradually fail in strength or develop acute symptoms and have to be sent back to the city, where they are received in the hospital for advanced cases and remain there until they die.

This peculiarity of the disease has created a need for buildings on sanatorium grounds where patients who have come to be cured, but develop symptoms of advanced disease, can be housed for a while. There is also a need in all large sanatoria for a building where patients taking the open-air treatment can be placed if they develop some other acute disease which requires nursing. Buildings used for these purposes are called infirmaries, and combine the structural details of both the general hospital and the large open-air buildings of the sanatorium. They are often constructed as a complete unit and are administered separately from the other sanatorium buildings. Many of them have a dining-room, kitchen, and quarters for nurses and servants who do not have any relationship, except an official one, with the rest of the institution.

The buildings erected for the purpose of housing advanced cases also bears a close resemblance to the infirmary, as it is growing to be the opinion of many authorities that the advanced case does better in the open air, and can stand with benefit a comparatively large amount of cold and exposure.

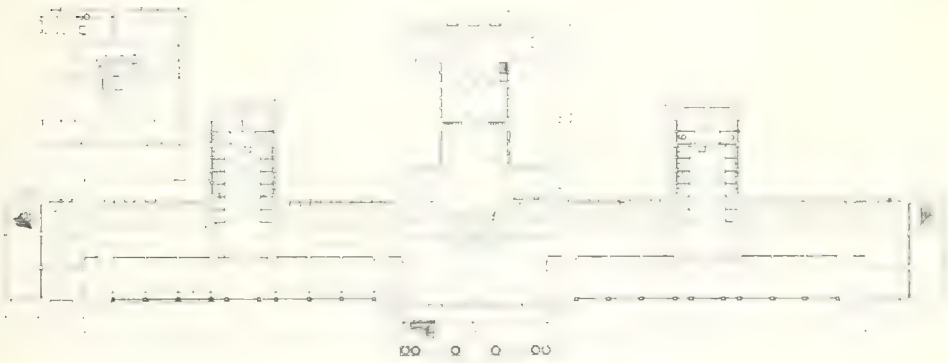
While it is necessary that buildings for both these purposes should have the comforts and conveniences of a general hospital, it is also very essential that they have large open-air verandas, with windows cut down to the floor or doors from the wards and rooms, through which beds can be rolled. It is now believed that porches should be used in pleasant weather by patients even when far advanced in the disease.

A very important point to be taken into consideration in constructing these buildings is that tuberculous patients in the last stages are very annoying to each other. The constant coughing and expectorating of one not only worries the others, but is also a suggestion to cough for all in the ward, and is the cause of many a paroxysm of coughing which could be controlled if patients were not placed close together in crowded wards. Separate rooms should take the place of wards, and when this is not practicable, partitions can be erected between the beds. The same reason holds good in regard to two rows of beds in large wards, and placing them in this manner should be avoided when possible.

All buildings intended for housing advanced cases must be heated in some way. Provision is usually made for a heating plant in the basement if they are not designed for an institution having a separate power and heating plant.

In deciding upon a site for buildings which are to be heated from a central plant it is well to remember that such structures must stand upon higher ground than the one from which the heat is supplied, so as to allow for the return of water and condensed steam in the pipes

No. 39.—Eudowood Sanatorium, Maryland, Infirmary Building. Wyatt and Nolting, Architects; Estimated Cost, $30,000. Capacity, 30 Patients.

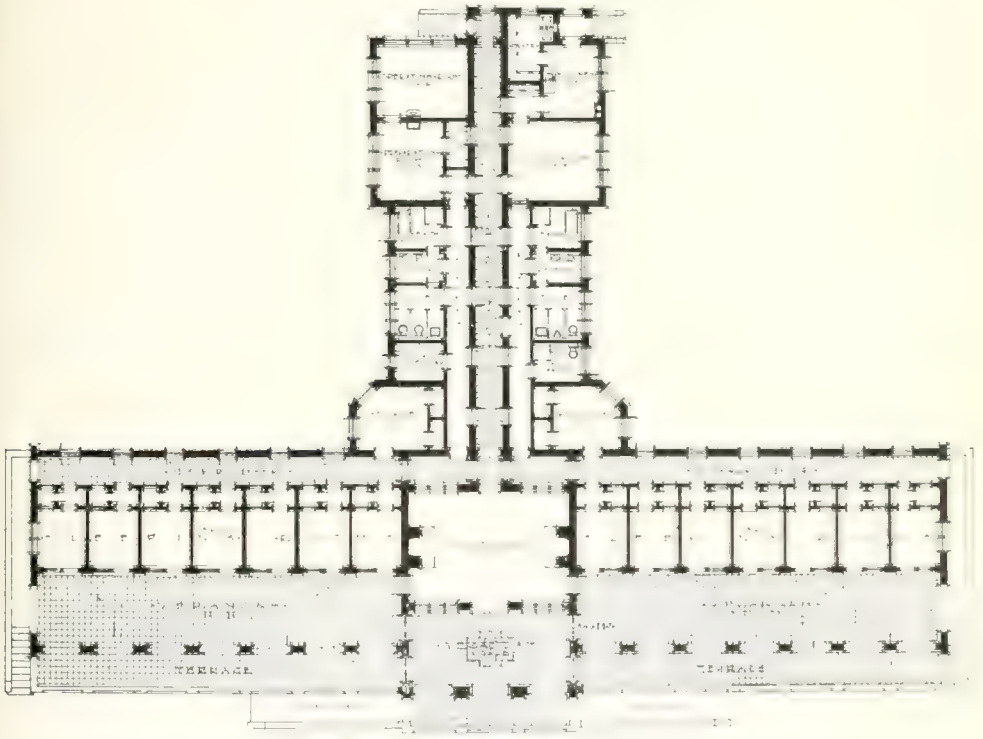


No. 40.—Eudowood Sanatorium, Infirmary Building, Floor Plan.

The Infirmary, or Marie Bloedel Memorial Hospital, at the Eudowood Sanatorium (illustrations 39 and 40), was constructed in 1908, and is considered a good model building for housing advanced cases at a large sanatorium well provided with other buildings. It has accommodations for 30 patients, 24 being cared for in small wards and 6 in private rooms. Comfortable quarters are provided for the nurses and attendants, together with a private alcove for each patient in the dressing-room. In the center of the building is a dining-room, kitchen, and other necessary apartments to make the building a complete unit. The cost of construction, including furniture and equipment, was $30,000. The plans are worth careful study. A unique feature of the building will be noticed in the way the three private rooms are arranged at the ends of the wings, with a private porch which cannot be overlooked from the main building.

No. 41 – LAKEWOOD SHOPPING MALL, MAIN PARKING AREA, LAKEWOOD, CALIF., JOHN A. LOS, ARCHITECT, PLANNED COST $15,000,000, CAPACITY, 64 PARKS

No. 42.—Ohio State Sanatorium, Infirmary Building. F. L. Packard, Architect; Estimated Cost, $18,000. 14 Separate Rooms for Patients.



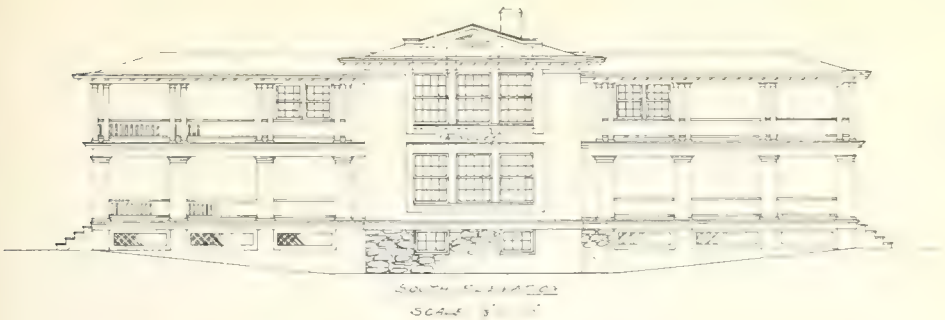
No. 43.—Ohio State Sanatorium, Infirmary Building, Floor Plan.

The men's pavilion at The Lakeville Sanatorium (illustration 41) has a capacity for 64 advanced cases and is divided into two wards and two pavilions. The center of the building, including the extension, is 35 by 62 feet and contains a sun parlor, three small wards, a diet kitchen, treatment room, toilets and baths. The two main wards, for 20 patients each, are 64 by 20 feet, with an open-air pavilion for 12 patients, extending 59 feet from the outer ends of the wards, built in the form of a right angle. Over the center of the building is a second story, 50 by 35 feet, divided into nine rooms, and under it has been excavated a cellar used for locker, toilet, and storage rooms.

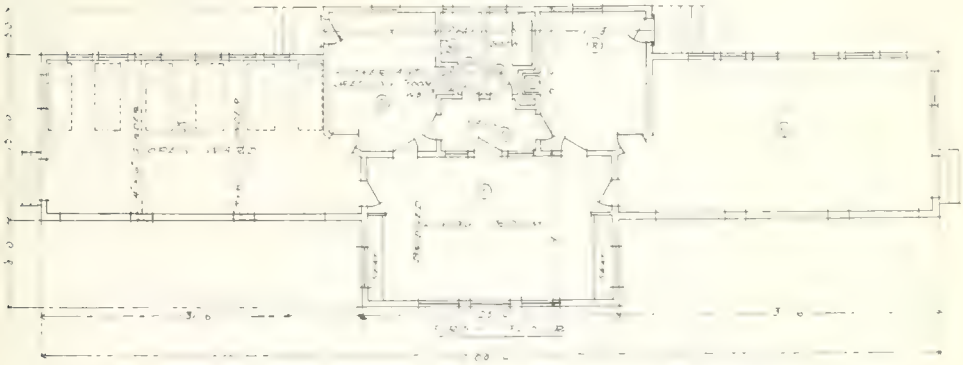
The proposed infirmary of The Ohio State Sanatorium (illustrations 42 and 43) has a number of good features. Patients are housed in separate rooms 8 by 10 feet, with a wide veranda in front and a corridor in the rear. The extension in the back of the building has the rooms needed to make it a complete unit. The arrangement of the passageways and corridors and the placing of the different rooms necessary for administrative purposes should be noticed. The operating room may not be necessary in such a building, and the room not needed for this purpose can be put to other uses.

No. 11.—Oswald's Sanatorium, New York, Women's Isolemaby Building; Estimated Cost, $25,000.
For 12 Patients in Open Wards and 4 Patients in the Enclosed Room.
Designs of the Department of Health

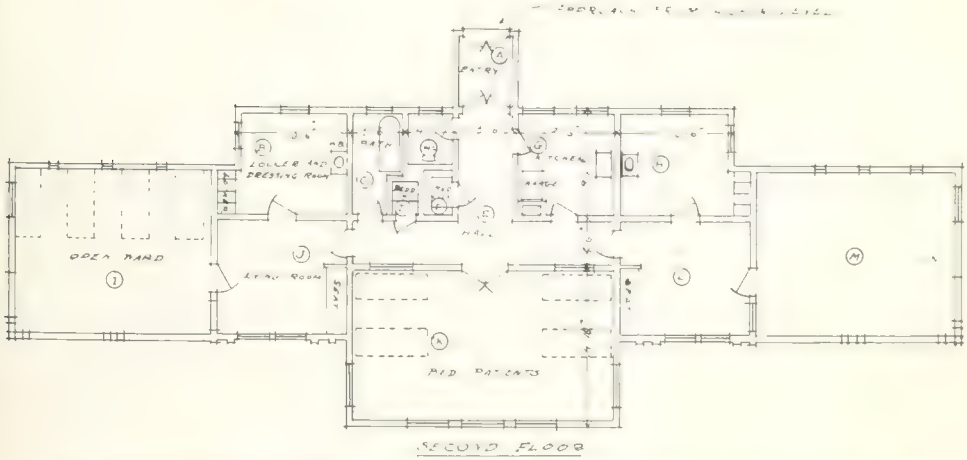
No. 12.—Oswald's Sanatorium, Women's Isolemaby Building. Rear View



No. 46.—Otisville Sanatorium, Women's Infirmary Building, Front Elevation.



No. 47.—Otisville Sanatorium, Women's Infirmary Building, First Floor Plan.



No. 48.—Otisville Sanatorium, Women's Infirmary Building, Second Floor Plan.

The Women's Infirmary, at the New York City Department of Health Sanatorium, Otisville (illustrations 44, 45, 46, 47, and 48), is a combined infirmary and open air ward structure for 24 patients. It is two stories high, housing 20 patients in four open wards and 4 patients in a closed ward on the second floor. In the center of the building is a locker and dressing-room, toilets and baths in connection with each open ward, and a small diet kitchen behind the infirmary ward. The length of the building is 87 feet, with a width through the wards of 16 feet and through the center of 28 feet. The room used as an infirmary and the sitting-room on the first floor are 24 by 14 feet. There is an excavation for a cellar under the central portion of the building, 29 by 25 feet, which contains a steam-heating plant, arranged for steam radiators using the direct system, and a water heater supplying hot water for toilet purposes, connected by modern plumbing throughout the building. The open wards on the second floor are small, 18 by 16 feet, as the necessary apartments needed in connection with the infirmary take up a part of the floor space. The wards on the first floor are larger, 27 by 16 feet, and have room for six beds each. The building has a very attractive exterior covered with shingles stained green with cream color trimmings, and a roof, also of shingles, stained a Tuscan red. There is no stairway connecting the two floors, as the building stands on a side hill and has a passageway from the second story out to and on the hill leading down to the lower floor. The front windows are arranged for both sashes to slide into pockets, leaving the opening entirely free and so practically changing the infirmary into an open-air ward when desirable.

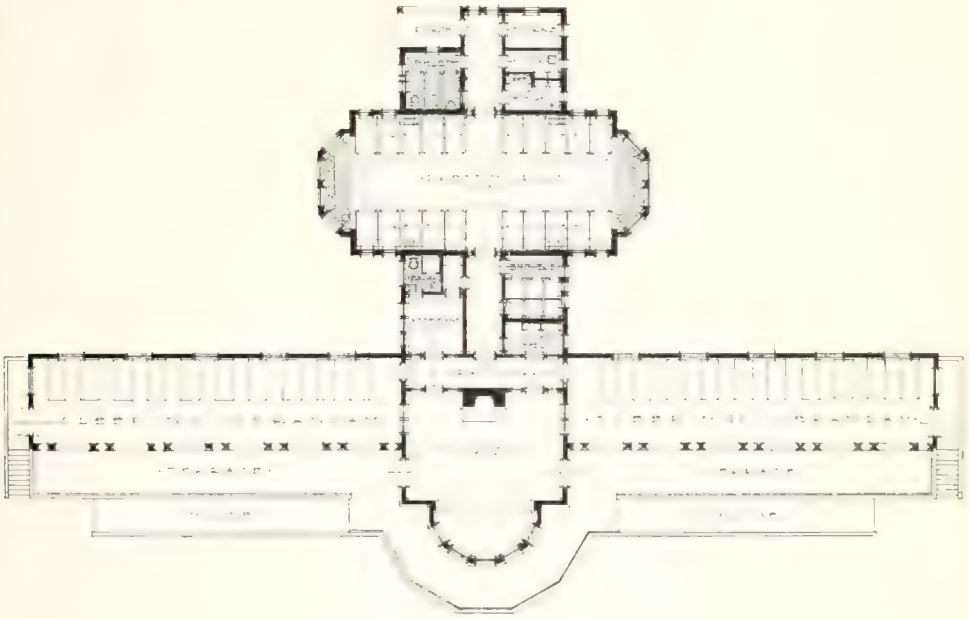
Housing advanced cases of tuberculosis in hospitals or sanatoria built for their exclusive use is a comparatively new problem. There is a difference of opinion among physicians who have had a large experience in dealing with the disease as to the degree of cold and exposure which will benefit these patients. The plans of building for them, illustrated in this section, are in some instances structures designed to house incipient patients, but can be modified to suit climatic conditions.

There are now in use for advanced cases a number of buildings constructed on the lean-to plan but finished with plaster on the interior. These are closed in front with glass and sash windows and make very satisfactory quarters when heated. This is a simpler method of housing than the more substantial structures built on the block plan, like many general hospitals, and has the advantage of providing plenty of porch space. This plan, while combining many good points of both types of construction, is cheaper, as a lean-to for 16 patients finished for advanced cases can be built for from $5000 to $10,000, and when near an administration building, can be administered more economically than a costly structure.

Great care must be taken in planning a building of this type for advanced cases to obtain good ventilation when the front is closed. A study of the roof ventilation used in some of the lean-tos and the placing of windows in the sides and rear of others can be made from the illustrations in Section IV.

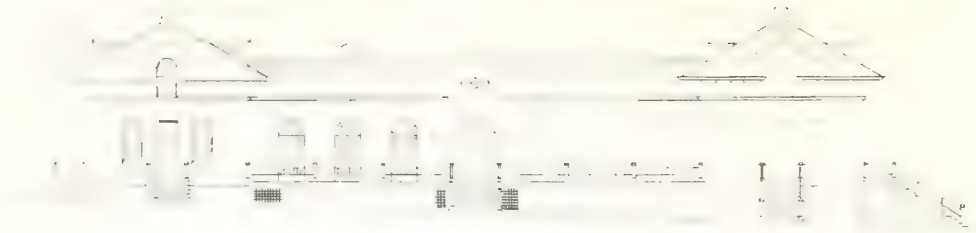
A number of hospital buildings in Massachusetts are ventilated by two rows of windows placed in a break of the roof. This method of ceiling ventilation is shown in one of the buildings used at The School for Crippled Children, Canton, Mass. (illustrations 59 and 60). The roof windows are 2 by 3 feet, with a 4-inch casing, and have six panes of glass to a window. They can all be opened and closed by fixtures arranged for that purpose on the end walls, and when used in connection with large window space on all sides of the ward are an excellent way of obtaining good ventilation in buildings for housing advanced cases. The side walls of the wards are 10 feet 6 inches high on the interior, with a further rise in the ceiling of 4 feet before the break in the roof is reached.

No. 49.—Ohio State Sanatorium, Proposed Cottage for 20 Patients; F. L. Packard, Architect; Estimated Cost, $6500.

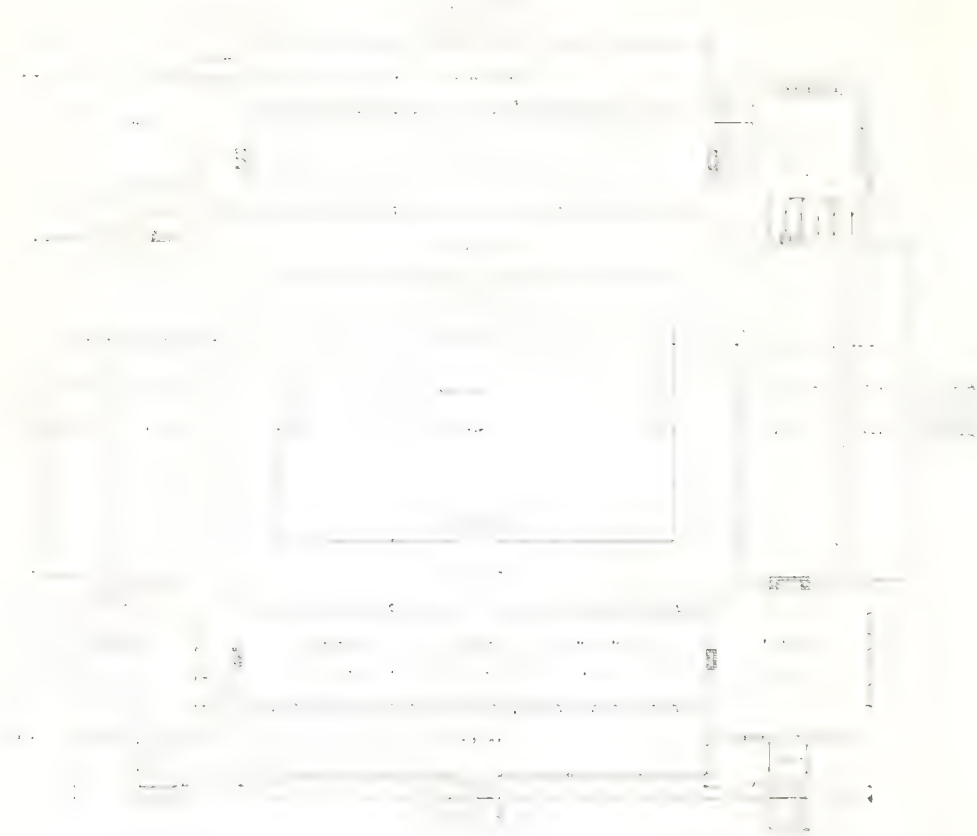


No. 50.—Ohio State Sanatorium, Proposed Cottage Shack, Floor Plan.

The proposed cottage for The Ohio State Sanatorium (illustrations 49 and 50) is designed after the lean-to type of building, but has certain deviations from the usual plans which are worth considering. The structure will house 20 patients, and supply each one with a large dressing alcove. These little private dressing rooms are much appreciated by the patients, and add greatly to their comfort. There are more rooms than are usually planned in lean-tos used for incipient cases, such as a linen closet, diet kitchen, nurses' room; but all these are very useful if the building is used for advanced patients. The rear extension is the unique feature of this building, as the floor plan is designed in the shape of a cross. The dressing-room, 22 by 42 feet, is situated in the center and extends out on each side, making a break in the walls. While this increases the cost of construction, it adds largely to the space which can be used for windows.



No. 51.—United States Hospital, Fort Bayard, N. M., Side of Front Elevation.



No. 52.—United States Hospital, Fort Bayard, N. M., Plan of Front.

The United States Hospital, Fort Bayard, New Mexico, illustrations 51, 52, 53, and 54, is one story high, built of concrete and adobe, a court 52 by 72 feet. A veranda extends around the court on the inner side of the building, 12 feet wide, upon which the beds are placed for the open-air treatment. The building, including the court, covers ground space 100 by 130 feet. At each corner is a room 23 feet square used for different purposes and connected with each other by a long, narrow apartment, 14 by 68 feet on two sides of the building and 14 by 50 feet on the other. These are used for dressing- and living-rooms, and have on the outer side a porch 9 feet wide, corresponding to the porch on the court. This type of building is used in dry, tropical countries, but will make good patients' quarters anywhere if the porches are protected from the weather.

No. 53.—United States Hospital, Fort Bayard, N. M. Rectangular Building with Open Court in Centre. Designed by Major George E. Bushnell.

No. 54.—United States Hospital, Fort Bayard, N. M. View of Inner Court Showing Sleeping Porches.

No. 55.—Perspective.—Hospital.—New York City.—Concrete.—Pavilion for 58 Patients.
Dept. of Public Parks.—Riverside Hospital.—Wm. Sanger, Asst. Architects.
Geo. A. Soper.

No. 56.—Plan.—Hospital.—New York City.—Concrete.—Pavilion, First Floor Plan.

The Concrete Pavilion, Riverside Hospital, New York City (illustrations 55, 56, 57, and 58), has a capacity of 58 patients, and is estimated to cost $30,000. The floor plan is designed on the lines of a letter U; a sitting room between two open-air pavilions with dressing-, toilet- and bath-room in a rear extension. This building is to be used for advanced cases, but is so arranged that the front can be thrown entirely open, making the wards on each story open-air porches. The building is 111 feet long by 18 feet wide through the wards, with a rear extension 43 feet wide and 16 feet deep. The wards on the first floor are 36 by 16 feet, with an apartment between them 29 by 15 feet, which is to be used as a dining-room.

No. 57.—Riverside Hospital, New York City, Concrete Pavilion, Second and Third Floor Plan.

No. 58.—Riverside Hospital, New York City, Concrete Pavilion, Fourth Floor Plan.

The wards on the second and third floors are 41 by 16 feet, with a room in the center for living purposes, 21 by 18 feet. The fourth story has two solarium wards, 41 by 16 feet, with an open-air sitting-room between them, 25 by 18 feet. This building is an experiment. It is to be built of reinforced concrete, and, although intended for the use of advanced cases, is designed to be as near to an open-air structure as possible.

The Riverside Hospital is on North Brother Island, at the upper end of the East River, near Long Island Sound. The institution is in an isolated position. The air is pure, and so far as climatic conditions are concerned is an ideal site for a sheltered open-air building. The authorities feel that the advanced patients sent there should be housed in a manner that will give them every chance of a cure, and these concrete pavilions are being built with the hope that some of the advanced cases will respond to the treatment and that all the patients housed in these structures will do better than they did in the old block type of hospital.

No. 5.—Massachusetts Hospital School for Crippled Children.—Illustrating the Exterior Appearance of Buildings Using the Massachusetts Method of Cupola Ventilation.
Wm. Gibbons Rice and A. Wadsworth, Architects
For description see page 54

No. 6.—Massachusetts Hospital School for Crippled Children.—Interior View, Illustrating the Method of Roof Ventilation Used in Some Institutions in Massachusetts.

SECTION VI

Patients' Quarters—Cottage Type of Building

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Patients' Quarters—Cottage Type of Building

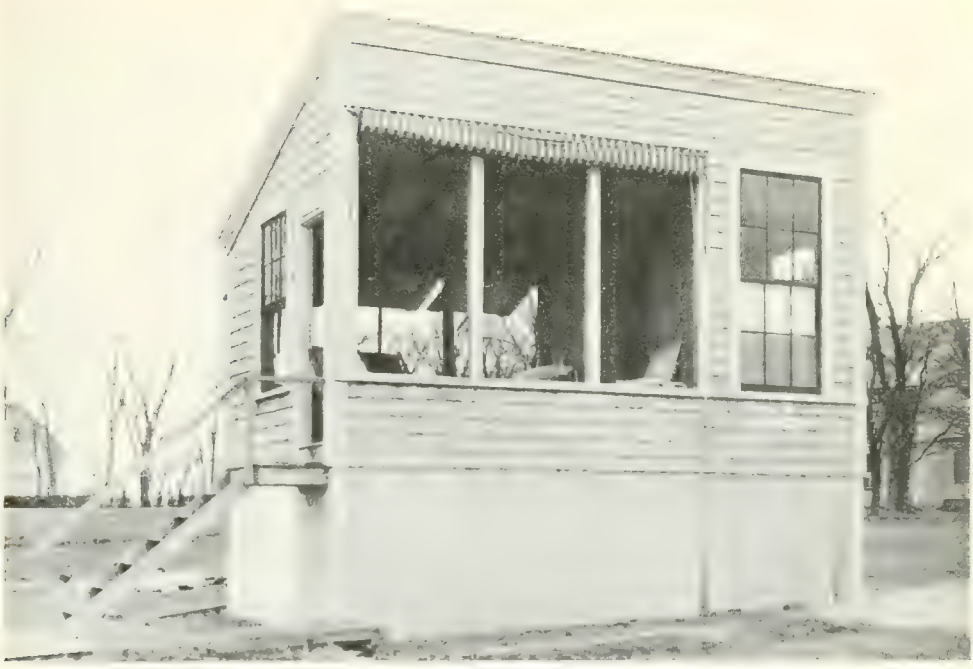
In most of the large private sanatoria it has been found that the lean-to type of building is not satisfactory for housing patients who are willing to pay for good nursing and attendance. Persons from well-to-do homes desire separate apartments, and often demand a porch which is protected and cannot be overlooked by other inmates of the institution. Cottages with a private room, separate porch, and all modern toilet facilities for each patient have been designed and are very satisfactory. These house four, six, or eight beds, and there has also been planned cottages for only one or two patients. At some institutions separate cottages are supplied to families of the consumptive, and these buildings are arranged to be used as separate units with private nurses and servants. Cottages planned for the use of one person only usually have but two rooms—one for dressing and toilet purposes and the other practically an open porch for sleeping and living. This type of cottage was designed by Dr. Millet and can be built at a very low cost. Many modifications have been made from Dr. Millet's plan, but these changes have usually increased the cost in obtaining a more substantial construction and a better interior finish.

Officials of public sanatoria housing patients from the poorer classes have found in many instances that the patients are more contented and improve faster when given a small building to themselves or are allowed to divide the room with one congenial room-mate. Many of the cottages are very inexpenisve, and a more careful study of the results obtained by the different methods of housing incipient patients may cause the construction of the cottage type of structure for State and county institutions in the place of the large, massive buildings still being erected in some parts of the country.

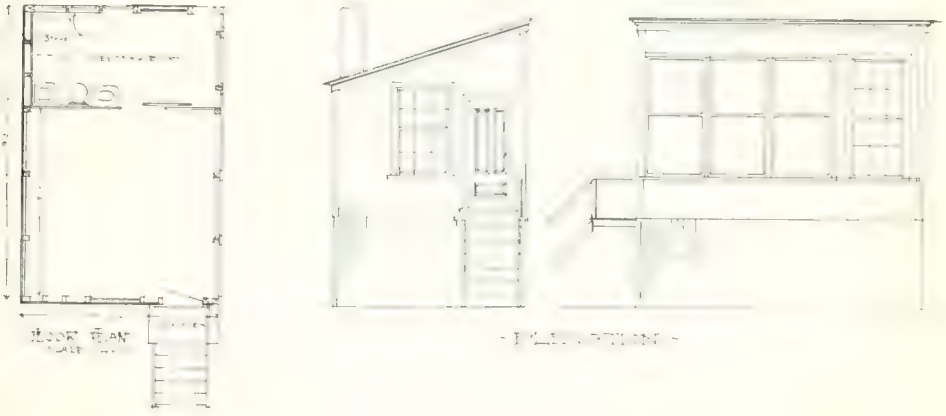
Those who have experimented with tents have in many cases abandoned their use and have stated that they did not prove a satisfactory method of housing incipient cases. Tents wear out quickly and are very hard to ventilate. For these and other reasons the different varieties of tents have not been treated in this work.

The Millet Cottage (illustrations 61 and 62) is 12 by 18 feet, supported on cedar posts, boarded and covered with shingles. The roof is laid at "quarter pitch," with the rise to the front. The cottage is divided by a partition into a bed-room 12 by 12 feet, open on all sides, and a dressing-room 6 by 12 feet, with two windows, heated by a stove and furnished with a stationary washstand, running water, a toilet, and wardrobe. The rear wall, 6½ feet high, faces the north and can be closed by wooden shutters. The cottage is constructed of wood. There is no plastering, and the floor is laid double, the upper layer of narrow, hard pine. The building complete cost about $200.

The Iowa Sanatorium Cottage (illustrations 63 and 64) is one of the cheapest buildings of the cottage type, and consists of a large sitting-room, 17 by 15½ feet, about which is built a 12-foot porch. In the rear is a dressing-room, 17 by 9 feet, containing lockers and toilet facilities. It was planned for 10 patients, but is more comfortable when only housing eight. Plenty of sunlight reaches the dressing-room, as the porch does not extend beyond the main apartment. It is claimed for this structure that part of the porch will always be sheltered at some point from a heavy storm, and patients will get sun from different directions during the whole day. The cottage cost $1400, and is so well liked that ten more are to be built this year. (Continued page 65.)



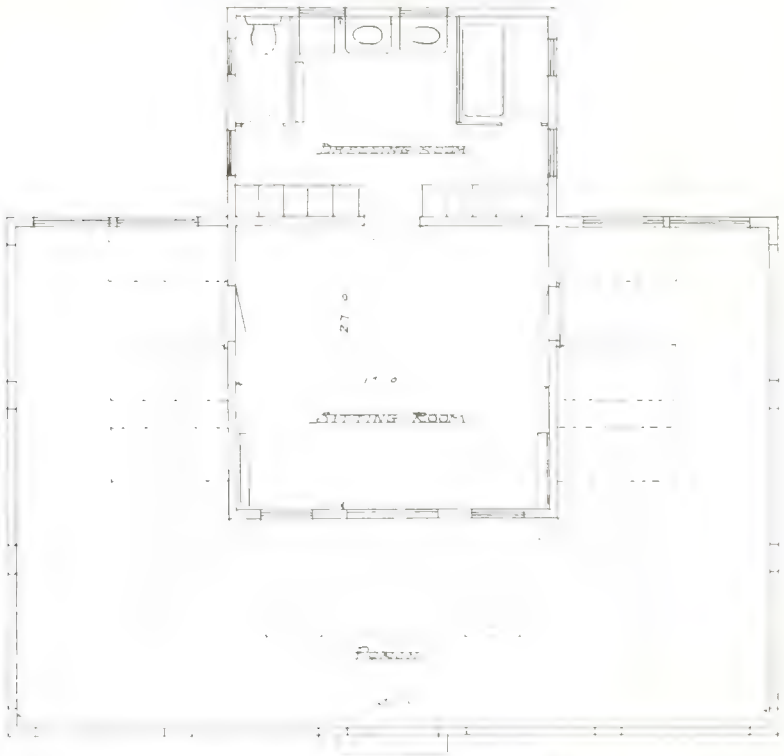
No. 61.—Millet Sanatorium, Mass., Cottage for One Patient. Estimated Cost, $250.
For description see page 62



No. 62.—Millet Sanatorium, Cottage, Floor Plan, Front and Side Elevations.

No. 63.—Iowa State Sanatorium Cottage. Type of Cheap Cottage for the Patients. H. F. Liebel, Architect. Cost, $15[illegible]

For description see page 65.



No. 64.—Iowa State Sanatorium, Cottage. Floor Plan.

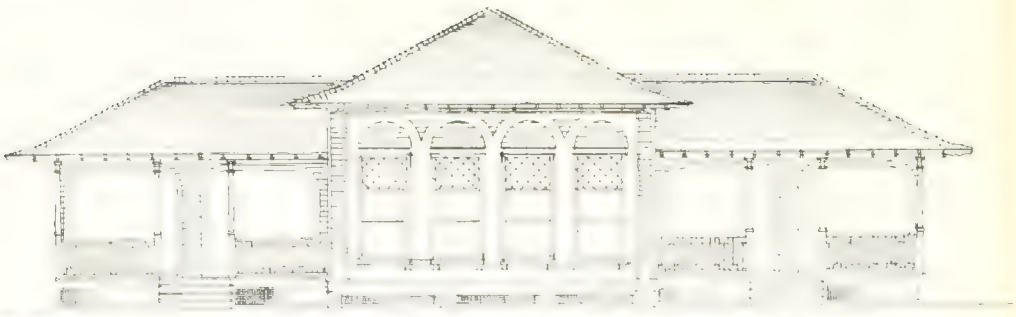
No. 65.—Otisville Sanatorium, New York, Cottage for Eight Patients
Designs of the Department of Health

No. 66.—Otisville Sanatorium, New York, Cottage for 8 Patients with Partitions Dividing the Porches into Small Rooms for Two Persons. Cost, $1200.

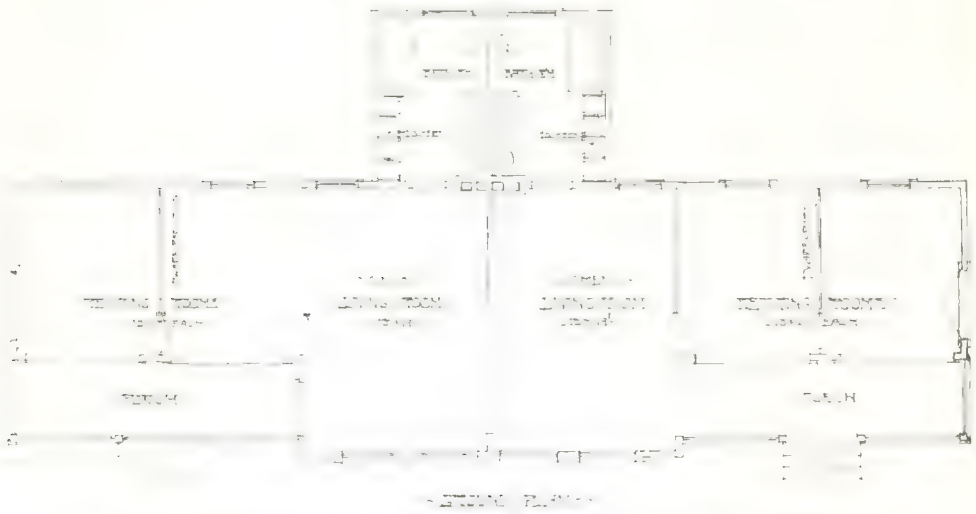
(Iowa Sanatorium Cottage, *continued.*)

There is also a medical and a kitchen cottage to be constructed on the same plan. The medical cottage has a laboratory, three examination and treatment rooms, two offices, and a small pharmacy. The kitchen cottage is divided into three large rooms, the kitchen in the rear, 12 by 21 feet, with two dining-rooms in the front, 12½ by 18 feet. These buildings look very much alike, as all the porches are built in the same manner.

The cottage built for The Otisville Sanatorium, New York (illustrations 65 and 66), has accommodations for eight patients. The front of the building is 58 feet long, with a porch on each side of a sitting-room which is 15 by 19 feet and contains the patients' lockers and a fireplace. The porches are divided by a partition, 8 feet high, into two rooms,



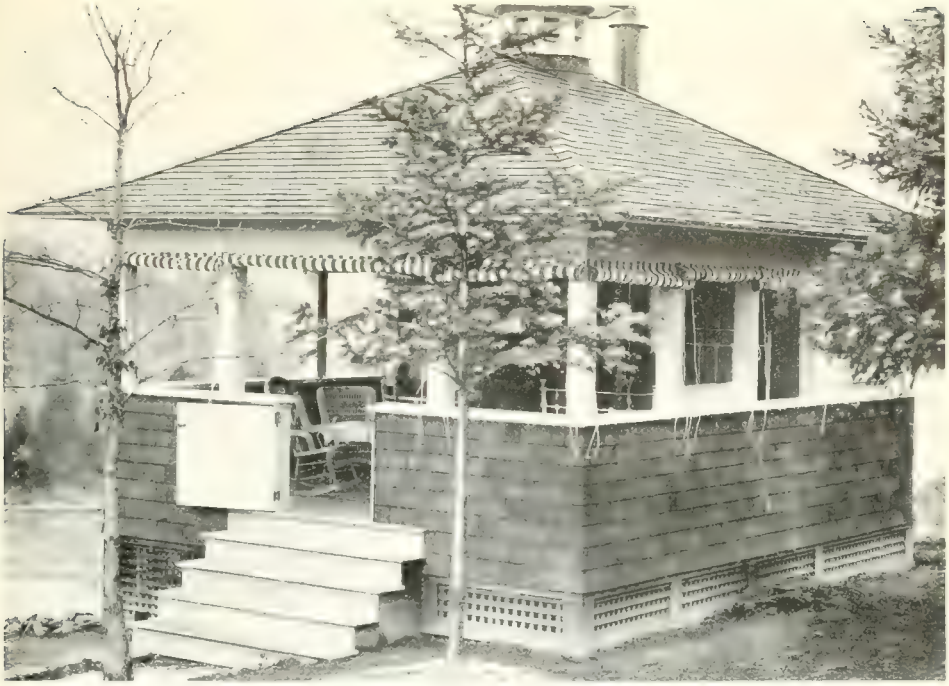
No. 67.—Front Elevation of the Modified Plan of the Olsville Cottage



No. 68.—Floor Plan of the Modified Plan of the Olsville Cottage

... by 12 feet, for two patients each. The veranda extends in front of all the porch rooms, 5½ feet wide. This cottage was built on a plan of the lean-to without a rear extension. It has a very attractive appearance, as it is covered with shingles artistically stained and trimmed. It has no toilets, baths, or dressing-room, and is intended to house only one sex, who must use a central toilet and wash-room in some other building. It is a cheaply constructed building and the floor plan can be easily changed for the use of small communities where only a few persons of both sexes need the open-air treatment.

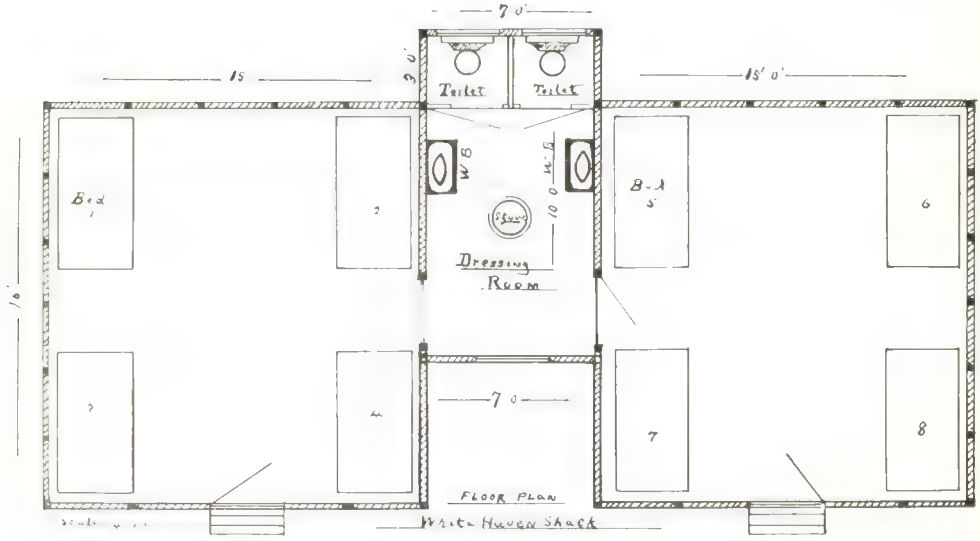
These plans were modified by Dr. Carrington (illustrations 67 and 68) and can be used to house four men and four women, when a building is needed in connection with a small town or county hospital. The modified building is 68 feet long, and has a solid partition running directly through the center, dividing the two sides of the building into two separate parts. There are two sitting-rooms, 13 by 19 feet, and two dressing-rooms, 8 by 12 feet, in the rear extension. The front elevation has one more window in the center, but otherwise has the same appearance as the original building.



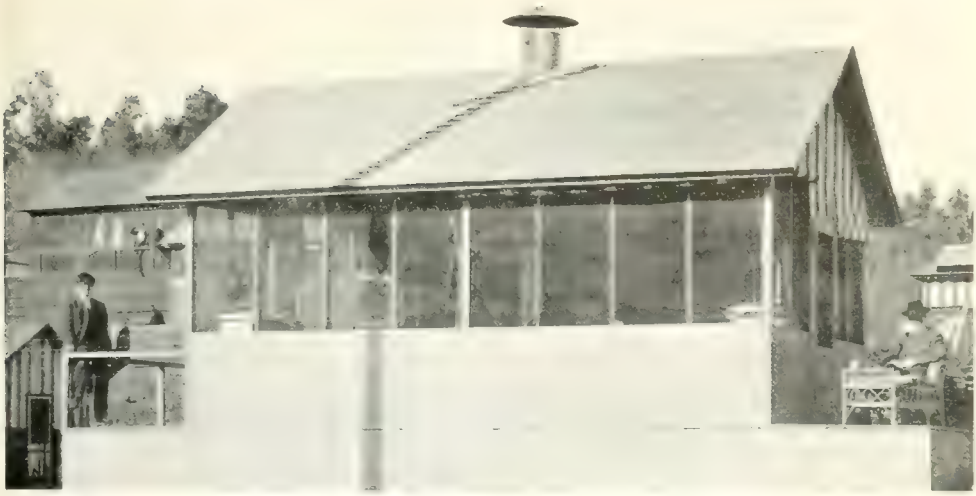
No. 69.—Portland, Oregon, Open-air Sanatorium, Cottage. Cost, $1000. For 1 or 2 Patients.
For description see page 7

No. 70. Portland Open-air Sanatorium, Cottage. View of Interior, Showing Finish and Closets at the End.

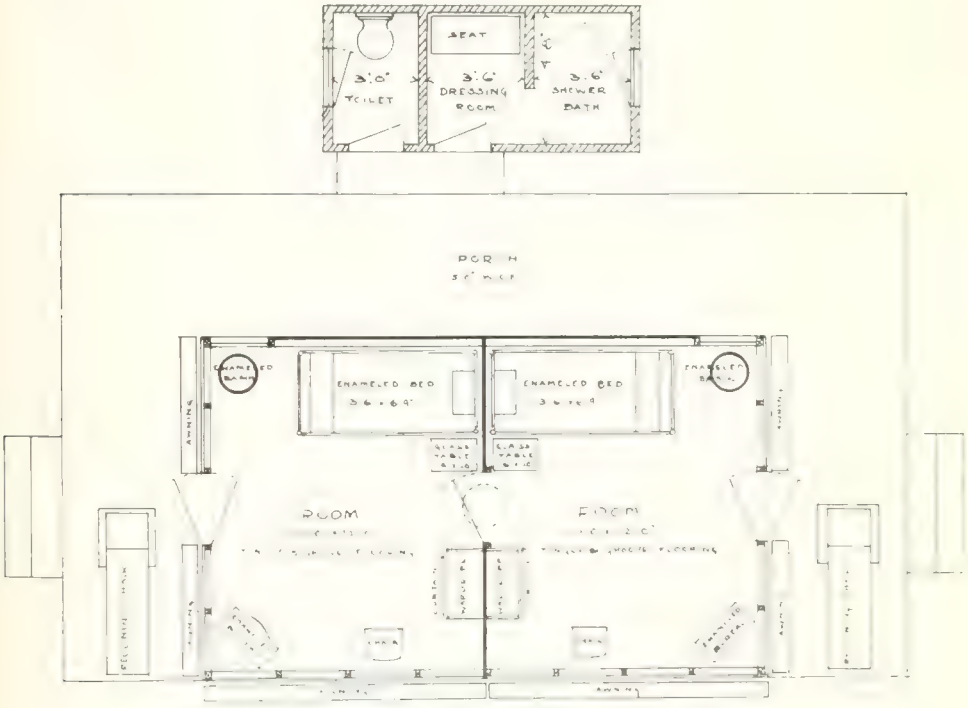
No. 71. White Haven Pattern Sanatorium Cottage for 8 Patients, Estimated Cost $8[illegible].
For description see page 7



No. 72. White Haven Sanatorium Cottage, Floor Plan



No. 73.—Barlow Sanatorium, California. Cottage for 2 Patients. Estimated Cost, $[illegible].
For description see page 70.



No. 74.—Barlow Sanatorium, Cottage, Floor Plan.

The Cottages at The Open Air Sanatorium, Portland, Oregon (illustrations 69 and 70), are very attractive and convenient. They are built for one patient, and can be used at a private sanatorium where charges are high. The open-air room is 13 by 16 feet, with a bath-room 7 by 8 feet, and two closets, 3 by 4 feet, at the rear. There is a little hall from the main room which divides the bath-room from the closets, and the interior is very nicely finished in hard wood. The exterior is covered with stained shingles and trimmed with white. A number of these cottages have been built, and should be classed with the more substantial type of open-air buildings. They are all raised on piers, bringing the floor 2 feet 6 inches above the ground. This air-space prevents dampness and is enclosed with lattice work. The ceiling is of selected narrow boards, and also has an air-space between it and the roof, which is a very necessary precaution, and should always be made when constructing cottages in countries where the sun's direct rays are very hot during the middle of the day.

The Cottage at The White Haven Sanatorium, Pennsylvania (illustrations 71 and 72), has two open-air pavilions, 15 by 16 feet each, connected by a dressing-room, 7 by 10 feet. This cottage houses eight patients, all using the dressing-room in common. The building is of cheap construction and can be covered with shingles or clapboards at a cost of about $100 per patient. This type of cottage can be used for housing one or two patients in each room and the size of the pavilions, if used in this way, cut down.

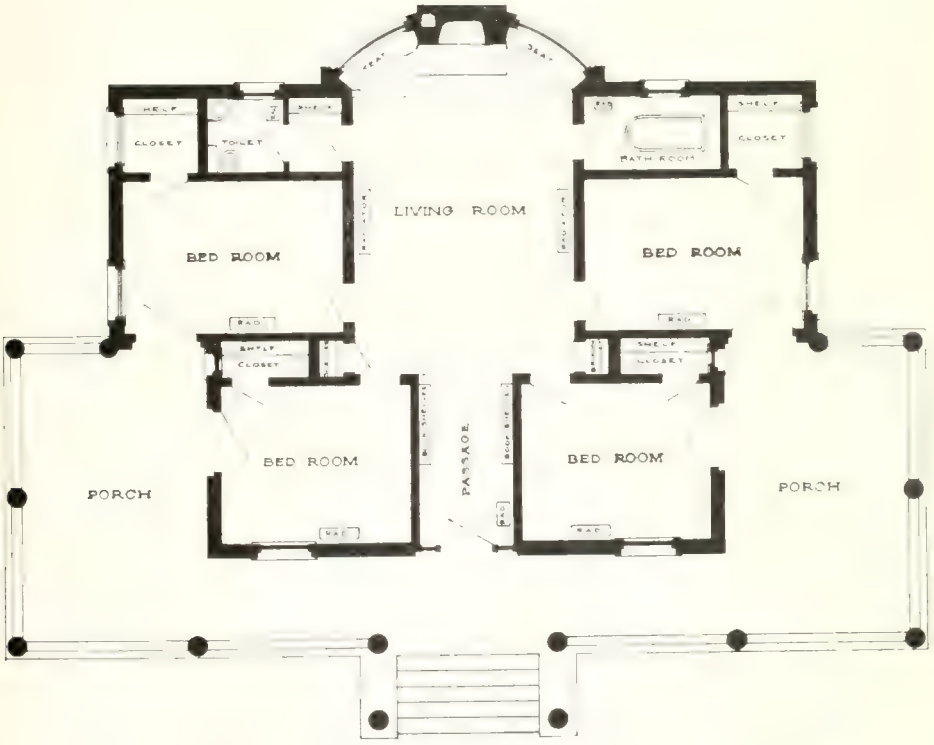
The Cottage at The Barlow Sanatorium, California (illustrations 73 and 74), is built for two patients, each having a private room. The building is 12 by 20 feet, divided in the center by a partition, through which is cut a communicating door, and surrounded on three sides by a porch 5 feet wide. The toilet-room in connection with these cottages is placed in a small separate building at the rear and divided into three compartments for bathing, dressing and toilet purposes. This is a good plan where earth closets are used in dry countries, as they can be emptied without disturbing the patients.

The Nathan Cottage at the Adirondack Cottage Sanitarium (illustrations 75 and 76) is built of yellow terra-cotta brick, and finished inside with hard maple. The cottage is so situated that the verandas have a southern exposure with glass shelters on the east, north, and west, thus insuring protection and the maximum of sunshine during the winter months. It is built to accommodate four persons. The sitting-room—14 by 20 feet—is in the rear, with two bed-rooms, 10 by 12 feet, in front, and two on the side, 9½ by 14 feet, all having a combination door and window opening on the veranda, which is arranged so as not to shade the rooms from the sun. The building may be ventilated in several different ways by means of transoms. All windows and doors are brought flush with the ceiling, and each bed-room has a large closet, well ventilated by a window. The total cost, including furnishing, was $5000.

The Orchard Cottage at Loomis Sanatorium (illustrations 77 and 78) is a frame building for four patients. The bed-rooms, about 9 by 10 feet, were made small intentionally to encourage the patients to live on the porches. There is a large basement, a commodious attic, which can be divided into several rooms, a small living- and drawing-room combined, 12 by 18 feet, a kitchen, 10 by 11 feet, maid's room and bath.

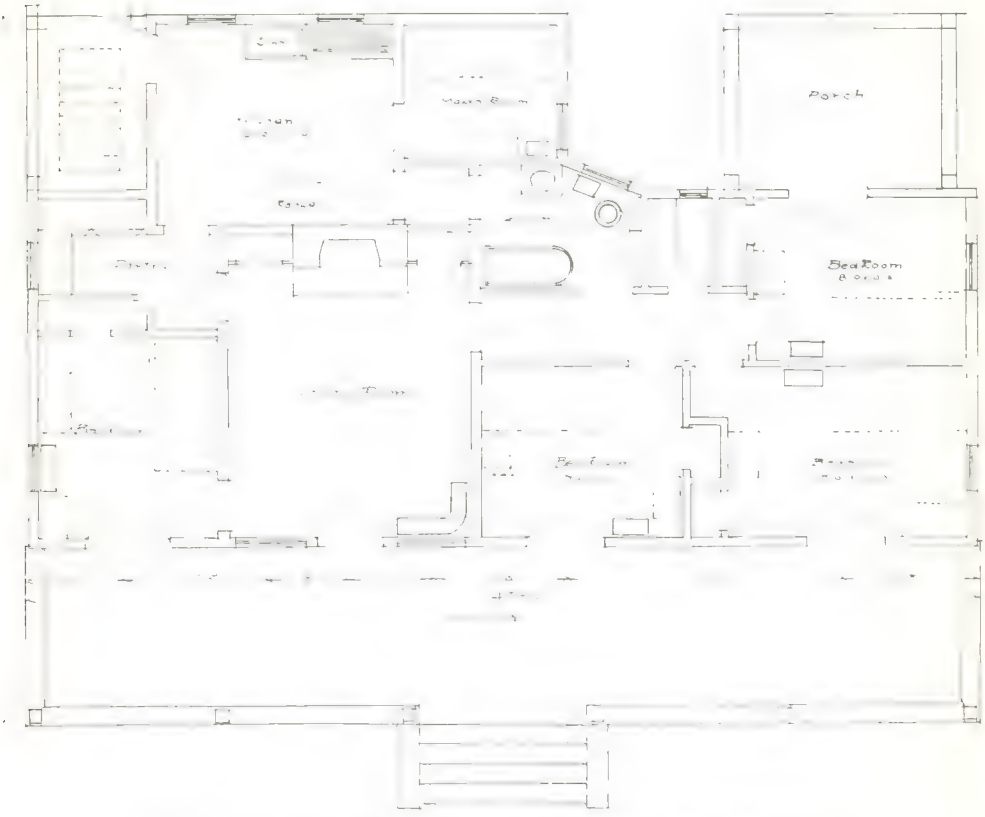
The front bed-rooms have doors opening onto the main porch, which is 47 by 9 feet. The sitting-room has a large fireplace, and the plan will interest those who believe in utilizing corners and other small waste places. This cottage is more like a pleasant country home than an institutional building, and can be built at a cost of about $3500.

No. 75.—Adirondack Cottage Sanitarium, N. Y., Nathan Cottage. Scopes & Flusmann, Architects. Good Type of Cottage in Connection with Administration Building. Four Patients, Cost $5000.
See description page 70.



No. 76.—Adirondack Cottage Sanitarium, Nathan Cottage, Floor Plan.

No. 77.—Bungalow erected near New York. Owner's Contract. Scores & Feusmann, Architects. Gable Finish. Shingle Roof and Sides. Cement Foundation. Four Rooms. Cost $3,[illegible]. See description page 7.



No. 78.—Floor Plan of Bungalow. Owner's Contract. First Floor Plan.

SECTION VII

Remodeled Farm-houses

SECTION VII

Remodeled Farm-houses

There is often opportunity to remodel a farm house or a country residence on sanatorium grounds and to use the building as an administration center or for patients' quarters. The two illustrations given here are both taken from the Loomis Sanatorium, as they are good examples of what can be done in this way. Large sleeping porches are easily planned and can usually be placed on the south side of a house; but the chief problem in remodeling old buildings for housing patients is the making of the structure sanitary. Careful inspection of the plumbing, drains, and cellar should always be made by an experienced sanitarian. The walls of the cellars, if damp, must be exposed by a trench opened on the outside of the house and a new wall built beside the old one, leaving an air space between the two walls, or some other method should be used to obtain a circulation of air about the foundation. The cellar floor should be relaid with a foundation of broken stone and covered with cement. Openings should be made in the cellar to procure plenty of light and air. The greatest care must be used to prevent dampness around the building, and in some places a subsoil system of drainage will be needed, while in others trees may have to be removed when growing close to the house.

In all rooms, where there is sufficient wall space, new windows should be made, and old windows cut down to the floor and up to the ceiling. Ventilation must be considered for the winter months, and fireplaces, ventilating flues, and other appliances used to give a continuous change of air, placed in all the rooms.

Often baths and toilets will need to be installed and a connection made with the water-supply and sewage-disposal plants, but when this work has been completed a good permanent building will have been added to the institution at a very much lower cost than the construction of new quarters.

Many old farm-houses are built of heavy timbers which usually are well preserved and can be repaired and put in excellent condition without great expense. When planning a rearrangement of an old building for administration purposes, a large dining-room is usually the most important apartment to be provided and often can be made by removing the partitions between rooms and throwing two or three together on the ground floor. Many institutions have been started in old buildings which were only large enough to house a kitchen, dining room, and office on the first floor, and a few rooms for the staff on the second. Good work can be done in very poor surroundings, and a small hospital started in this way has often provided for large numbers of patients.

An old country mansion will often make a good administration center for a small, private sanatorium, in many cases without remodeling. Small cottages of the Millet type (illustration 69, 70) or those of the Open-air Sanatorium, Oregon (illustration 69, 71), can then be built about the grounds for a comparatively small outlay. This method of founding a hospital proved a success in Pittsburg, Pa., where a large residence and four acres of land were obtained. The house was remodeled and converted into a hospital of 40 beds. Leantos were added when it was necessary to increase the capacity, and administered from the main building. The institution now accommodates 80 patients, and reports very satisfactory results.

No. 79.—Loomis Sanatorium, New York Hill Side Farm-house Before Remodeling.

No. 80.—Loomis Sanatorium, Hill Side Farm-house, after Porches were Added.

No. 81.—Loomis Sanatorium, Chapman Cottage.—A Remodelled Farm-house.—The Building of Sleeping Porches, Installing of Suitable Heating Plant, Tearing Down Partitions and Cutting Down Doors.Cost $1,200.

No. 82.—Loomis Sanatorium, Chapman Cottage.—A Remodelled Farm-house.View of Sleeping Porch, Showing Interior Finish.

SECTION VIII

Day Camps

SECTION VIII

Day Camps

As the open-air treatment of tuberculosis is more carefully and scientifically studied, the belief in the efficacy of the day-camp grows less. Institutions opened as day-camps have been converted into buildings where patients can be housed during the whole twenty-four hours, and a feeling has arisen among physicians and others that the day-camp is only a step in the education of a community toward the better care of its tuberculous citizens.

The Day Camp, Cambridge was erected and equipped for about $14,000. It is a one-story structure with a gable end. The building is divided into two wings, 25 feet wide by 50 feet long, which are used as living-rooms for the patients. The entire front of the wings is formed of glass doors, which can be removed so as to leave the front open. The veranda is 15 feet 6 inches wide in front of both wings, and the center of the building is used for administration purposes, containing an office for the matron, consultation room, and laboratory. Behind these is a small hallway leading to nurses' or attendants' quarters, and a small emergency room in the second story.

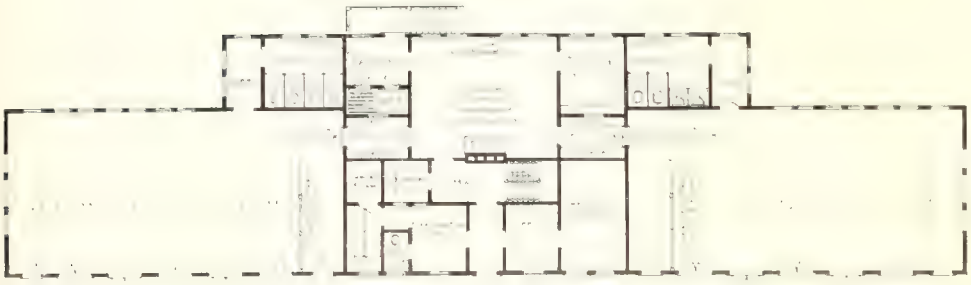
The Vanderbilt Clinic Day Camp is on the roof of a building in one of the congested districts of New York City. The floor is 58 by 143 feet, laid with tiles, and covered at one end by a steel shelter. The construction of the Camp cost $12,500; of this, $3500 was expended in tearing out the roof, laying the floor, carrying up the elevator shaft and housing it. This method of caring for consumptives is a new departure in large cities, and it may become a popular way of using the large waste space of flat roofs in cities and towns.

The Presbyterian Hospital Day Camp, Manhattan, is built of wood, 150 feet long by 36 feet wide, one story high, and unfinished on the inside. The veranda is 16 feet wide and provided with rolling canvas curtains, which can be dropped to protect the entire southerly side of the building. The structure contains a large kitchen, dining-room for patients, nurses' dining-room, rest room for men and one for women, lavatories, linen room, doctors' and nurses' quarters. The capacity of the dining-room is 180, but can be increased to provide places for 200 patients. The cost of the building, including equipment, was about $13,000.

Sea Breeze Junior, New York City, is an institution for sick babies. The pavilion illustrated here is a cheap and convenient open-air structure. When the blinds are raised, it is open on all sides, giving good cross-ventilation. There are no glass or sash windows, and the blinds all open on two different sets of hangers, as shown in the photographs. The building cost $1000 and has a capacity of 12 beds.

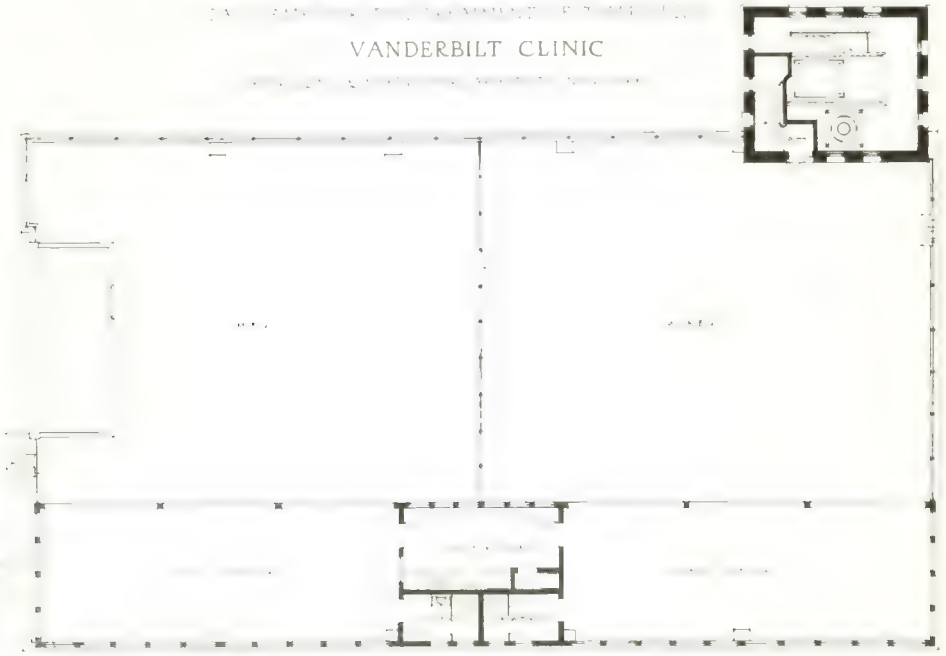
Four old discarded ferry-boats are now in use as day camps along the river front on the east side of New York City. Each boat cost about $5000 to repair and furnish. Some of them are also in use for men as night camps, and have proved to be very popular and extremely satisfactory for this kind of work.

No. 82. Cambridge, Mass. Day Camp. Cost, $[illegible]

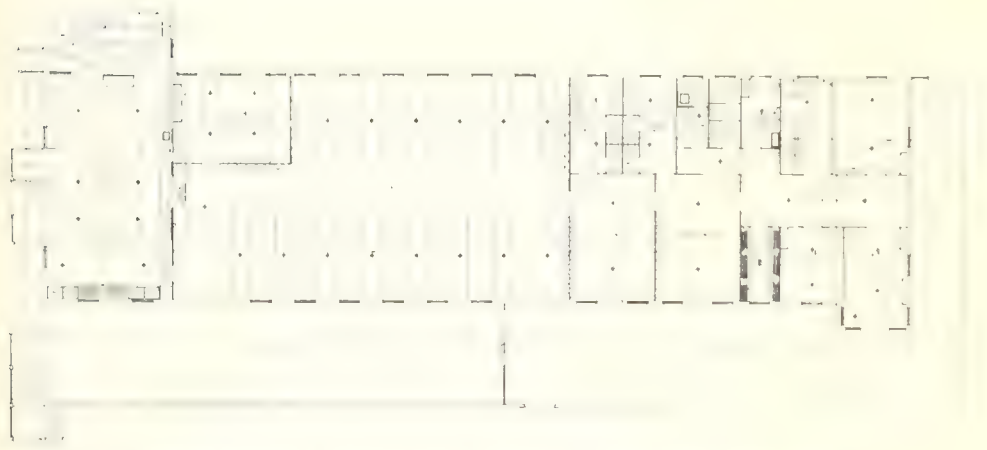


No. 84. Cambridge, Mass., Day Camp, Floor Plan.

No. 85. Vanderbilt Clinic Day Camp, New York City. Chas. Lewis & Wickenhoefer Architects. A Good Example of the Use of Roofs of Buildings in Large Cities for Open-air Day Camps. Cost of Laying Floor and Building Shelter, $12,500.



No. 87.—Boston, Mass., Consumptives' Hospital, Day Camp; Maginnis, Walsh & Sullivan, Architects. Cost, $13,000.



No. 88.—Boston Consumptives' Hospital, Day Camp, Floor Plan.
Length of Building, 153 feet. Width, 36 feet.

SECTION IX

Sleeping Porches for Home Treatment

SECTION IX

Sleeping Porches for Home Treatment

The use of porches as open air sleeping quarters for the treatment of tuberculous patients who wish to remain in their own homes has grown very rapidly. One great advantage in placing the patient's bed out of doors is that it removes the source of infection from the interior of the home and gives protection to the family. A few illustrations of verandas which can be erected easily and cheaply are given here. These can be constructed by any first-class carpenter, as they are simple platforms protected by a railing. There are often angles and projections to houses which will give space for placing a sleeping porch in a protected position, and these should be carefully considered before starting construction. The second or third story of a building is usually a better height for a porch than the ground floor, as there is danger in some localities from ground-dampness. Adjustable awnings can be used to keep the balcony dry in stormy weather. Lattice work hung on hinges is a good open protection where the porch faces a street, and in some cases wire screens will be necessary to keep out flies and mosquitoes. The material for cheap simple porches can be obtained for from $6.00 to $10.00. Good verandas can be erected by carpenters for from $12.00 to $25.00, and protected, well-finished structures can be built for from $25.00 to $100.00.

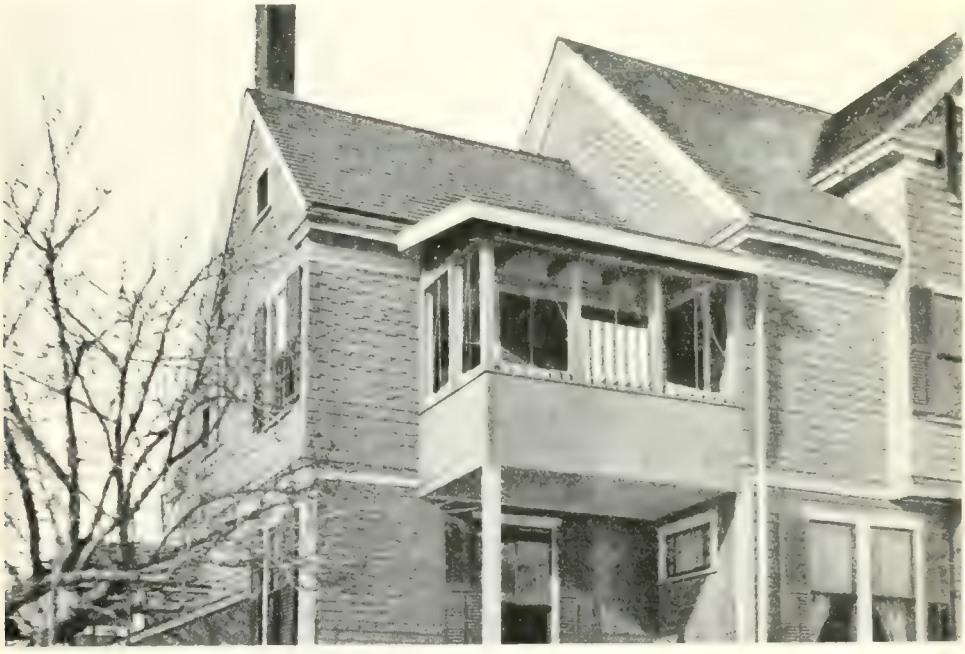
The south side of the house is usually the best situation for a temporary porch. The east or west side is preferable to the north, but where a house is so situated that only the north side can be used the porch should be enclosed on one side as it extends out from the house and at the north end. This method of enclosing gives a protection from the driving winter storms, and is practically a little lean-to for one person, with an eastern or western exposure, attached to the north side of a building.

A first floor veranda or porch roof can be used as a foundation upon which to erect a sleeping porch (illustration 91). A board floor should be laid over the roofing material, which is usually tin, on 2 by 4 timbers placed on edge, which will give a 4 inch air-space below the flooring. Where there is a perceptible pitch to the roof the floor can be raised at the outer edge until it is level. The use of a veranda roof with a desirable exposure is a very cheap and good method of obtaining a site for an open-air sleeping apartment. This can be protected, where economy is necessary, by a canvas awning, but such a porch with a well-built roof, lattice sides, and a window cut down to the floor for entrance into the house is an addition to the home which will always be useful both as an open-air sleeping room and a playroom for children.

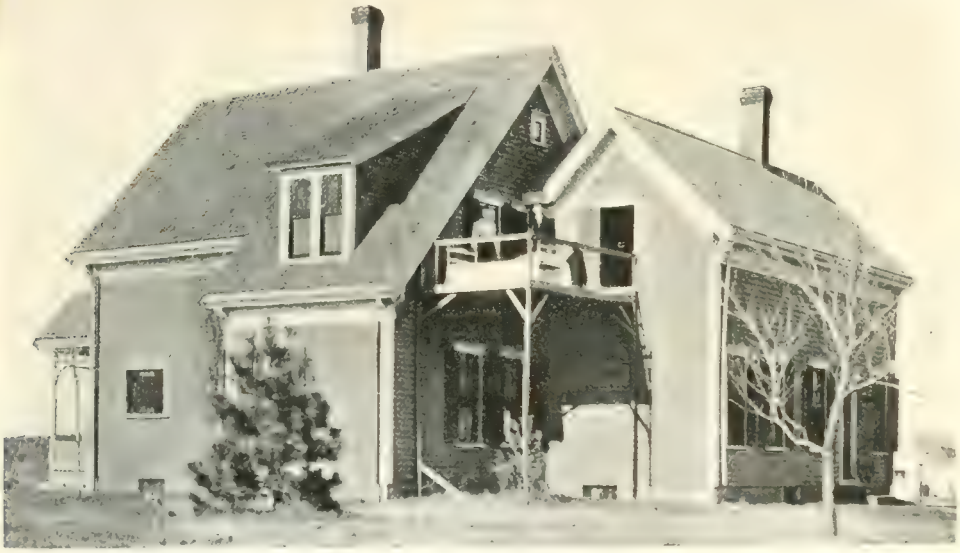
The porch (illustration 92) is practically a little room, 6 by 10 feet, firmly secured to the house and supported on the outside by a strong post. The walls are of pine sheathing and the floor is laid double. The interior finish is the natural wood, with exposed rough beams and rubberoid paper for a roof. The total expense, including outside painting, was $104.00.

Consumptives living in apartments and those who for other reasons cannot provide a sleeping porch should use one of the window tents made for home treatment. Dr. S. A. Knopf, of New York, has designed one which practically isolates the patient from the dwelling-room when resting in bed.

No. 91.—Sleeping Porch for Home Treatment Built on Veranda Roof. Estimated Cost, $100.



No. 92.—Well Built Porch with Roof and Canvas Sides for Home Treatment. Cost $[illegible].



No. 95.—Inexpensive Temporary Porch for Home Treatment, Without Roof Protection. Estimated Cost, $15.

The flat roofs of houses and buildings in large cities should be used by consumptives more than they are at present, as they offer every facility for open-air sleeping. On some houses the roof will have to be protected by a small board platform, which will also be necessary where the roof is sloping, to obtain a level space. Often some kind of shelter will have to be built of boards with 2 by 4 timbers as a support. The shelter should be built about 6 feet high, and fitted with a canvas curtain, which can be unrolled, making a slanting protection over the top of the bed to be used in stormy weather.

Many apartment houses in large cities have a small roof-house, rising eight or ten feet above the level of the roof, in which is housed the elevator shaft or upper end of the main stairway. The south side of these little roof-houses is a very well-sheltered position for placing a bed, and when the bed is protected by a canvas curtain for use in stormy weather these roofs afford every facility for open-air treatment practically without expense to the patient.

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Some plans and suggestion
for housing
consumptives

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